This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Dr White's School Histories,

PUBLISHED BY

OLIVER AND BOYD, EDINBURGH;

SIMPKIN, MARSHALL, AND CO., LONDON.

HISTORY OF GREAT BRITAIN AND IRELAND,

With an Account of the Present State and Resources of the United Kingdom and its Colonies. With Questions for Examination at the end of each Chapter, and a Map of the United Kingdom. By Dr White.

New and Cheaper Edition (the 16th), 3s. bound, 502 pages.

Athenæum.—"A carefully compiled history for the use of Schools. The writer has consulted the more recent authorities: his opinions are liberal, and on the whole just and impartial: the succession of events is developed with clearness, and with more of that picturesque effect which so delights the young than is common in historical abstracts. The book is accompanied by a good map. For schools, parish and prison libraries, workmen's halls, and such institutions, it is better adapted than any abridgment of the kind we know."

Literary Gazette.—"Carefully written, impartial, and accurate."

HISTORY OF ENGLAND for Junior Classes,

With Questions for Examination at the end of each Chapter. Edited by Dr White. Fcap 8vo, 190 pages, 1s. 6d. bound. 14th Edition.

Athenæum.—"A cheap and excellent history of England, admirably adapted for the use of junior classes. Within the compass of about a hundred and eighty duodecimo pages, the editor has managed to give all the leading facts of our history, dwelling with due emphasis on those turning points which mark our progress both at home and abroad. The various changes that have taken place in our constitution are briefly but clearly described. It is surprising how successfully the editor has not merely avoided the obscurity which generally accompanies brevity, but invested his narrative with an interest too often wanting in larger historical works. The information conveyed is thoroughly sound; and the utility of the book is much increased by the addition of examination questions at the end of each chapter. Whether regarded as an interesting reading-book, or as an instructive class-book, this history deserves to rank high. When we add, that it appears in the form of a neat little volume at the moderate price of eighteenpence, no further recommendation will be necessary."

Christian Witness.—"The narrative is terse and clear, while the questions are well framed, and such as to exhaust the subject. The qualities so important in such a work, accuracy and impartiality, may be relied on. The author has written as a man of no party, and as having no end to serve but that of truth. . . . We recommend the volume as an excellent school-book."

DR WHITE'S SCHOOL HISTORIES.

HISTORY OF SCOTLAND for Junior Classes,

With Questions for Examination at the end of each Chapter. Edited by Henry White, B.A. Trinity College, Cambridge, M.A. and Ph. Dr. Heidelberg, Author of "The Elements of Universal History," etc. Small 12mo, 160 pages, 1s. 6d. bound. 12th Edition.

United Presbyterian Magazine.—"Painstaking and judicious in his selection of facts suited for a popular history, calm and candid in the statement of them, clear and elegant in his style, generally impartial in his opinions, and quite master of the art of arrangement, Dr White is unsurpassed by any writer we know in the department of literature he has chosen to cultivate."

HISTORY OF SCOTLAND,

From the Earliest Period to the Present Time. With Questions for Examination at the end of each Chapter. Edited by Dr White. 12mo, 401 pages, 3s. 6d. bound.

This new Work is designed specially for the use of pupils who have more time to devote to the study of the subject than those for whom Dr White's smaller History of Scotland was written. In its preparation, advantage has been taken of the Critical Investigations which have from time to time been made into the several Periods. It will be found a complete History of Scotland, doing justice with impartial accuracy to all parties, and giving each event and period a due portion of narrative.

SACRED HISTORY,

From the Creation of the World to the Destruction of Jerusalem. With Questions for Examination at the end of each Chapter. Edited by Dr White. Fcap 8vo, price 1s. 6d. bound. 7th Edition.

Baptist Magazine.—"An interesting epitome of sacred history, calculated to inspire the young with a love of the divine records, as well as to store the mind with knowledge."

HISTORY OF FRANCE,

With Questions for Examination at the end of each Chapter, and a Map of the Country showing in colour the English Possessions in 1165—1453. Edited by Dr White. 12mo, 389 pages, 3s. 6d. bound. 6th Edition.

Liverpool Mercury.—"This is a summary of the actual recollections of a mind vividly imbued with those traces of the past, which time, in his race over the arena of human affairs, leaves most prominent and remarkable."

Athenæum.—"We have already had occasion to speak favourably of Dr White's 'History of Great Britain and Ireland.' The perusal of the present work has given us still greater pleasure. . . . Dr White is remarkably happy in combining convenient brevity with sufficiency of information, clearness of exposition, and interest of detail. He shows great judgment in apportioning to each subject its due amount of consideration."

[*Continued at the end of the Book.*

Now ready, 5th Edition, 2s. 6d.

CONCISE HISTORY OF ENGLAND IN EPOCHS.

By J. Fraser Corkran. With Chronological Tables and Maps, and Comprehensive Questions.

⁂ *Intended chiefly for the Senior Classes of Schools, and for the Junior Students of Training Colleges.*

The writer has endeavoured to convey a broad and full impression of the great Epochs, and to develop with care, but in subordination to the rest of the narrative, the growth of Law and of the Constitution.

Ninth Thousand, 2s.

HOUSEHOLD ECONOMY.

A Manual intended for Female Training Colleges, and the Senior Classes of Girls' Schools. By Margaret Maria Gordon (Miss Brewster), Author of "Work, or Plenty to do and how to do it," etc.

Athenæum.—"Written in a plain, genial, attractive manner, and constituting, in the best sense of the word, a practical domestic manual."

5th Edition, 2s ; or with Exercises, 3s. 6d.

GRAMMAR OF THE FRENCH LANGUAGE.

By Auguste Beljame, B.A., LL.B., formerly Teacher of French in Edinburgh, and now Professor in the Imperial College of St Louis, Paris.—Exercises separately, 2s.

The author has had in view to furnish to schools a short, simple, and practical French Grammar. He has aimed at giving all that is necessary, and nothing superfluous or likely to confuse the mind of a beginner.

6th Edition, 4s.

GREEK GRAMMAR FOR THE USE OF COLLEGES AND SCHOOLS.

By W. D. Geddes, A.M., Professor of Greek in the University of Aberdeen.

In the present work, the author has endeavoured to combine the clearness and conciseness of the older Greek Grammars with the accuracy and fulness of more recent ones.

Edinburgh: Oliver and Boyd.
London: Simpkin, Marshall, and Co.

181. g. 275.

13th Edition, Revised and Enlarged, 3*s.* 6*d.*

RUDIMENTS OF THE GREEK LANGUAGE.

For the Use of the Edinburgh Academy. To which has been added a List of Greek Verbs exhibiting the Cases which accompany each in its different Significations.

In this Edition, certain changes have been made for the purpose of increasing the utility of the work. In the Declensions and Conjugations some use has been made of the Stem-system; the Accentuation has been corrected throughout; a few of the Rules have been remodelled, and new observations inserted; while the List of Verbs, Anomalous and Defective, has been brought into exact accordance with the best recensions.

11th Edition, Revised and Enlarged, 3s. 6d.

EDINBURGH ACADEMY GREEK EXTRACTS, chiefly from the Attic Writers, with a copious Vocabulary and Analytical Index.

37th Edition, Re-arranged, Improved, and Enlarged, 1*s.* 6*d.*

MELROSE'S CONCISE SYSTEM OF PRACTICAL ARITHMETIC;

By Alex. Trotter, Teacher of Mathematics, etc., Edinburgh.

The Rules are now each followed by an example worked out at length and minutely explained, and they comprise an immense number and variety of *practical* Exercises, which give freshness and interest to the study.

KEY, containing Solutions at full length of all the Questions 2s. 6d., *now ready.*

NEW SERIES.—*Now ready,*

SCHOOL SONGS. By T. M. Hunter, Director to the Association for the Revival of Sacred Music in Scotland.

For JUNIOR CLASSES: *Second Series.* 63 Songs. 4d.

For ADVANCED CLASSES: *Second Series.* 46 Songs. 6d.

⁂ Also New Editions of the First Series of each, with Preface by James Currie, M.A., Principal of the Church of Scotland Training College, Edinburgh; 4d. and 6d.

Edinburgh: Oliver and Boyd.
London: Simpkin, Marshall, and Co.

KEY

TO

MELROSE'S ARITHMETIC;

CONTAINING

SOLUTIONS AT FULL LENGTH OF ALL THE
EXERCISES IN THAT WORK.

BY ALEXANDER TROTTER,
TEACHER OF MATHEMATICS, ETC., IN EDINBURGH,
Author of "Arithmetic for Advanced Classes," "Key to Trotter's
Complete System of Arithmetic," etc.

ADAPTED TO THE NEW REVISED EDITION.

EDINBURGH:
OLIVER AND BOYD, TWEEDDALE COURT.
LONDON: SIMPKIN, MARSHALL, AND CO.
1866.

Price Two Shillings and Sixpence bound.

181. a. 275.

3 JAN 8

PRINTED BY OLIVER AND BOYD, EDINBURGH.

CONTENTS.

PAGE
Numeration, 5
Notation, 6
Roman Notation, ib.
Simple Addition, ib.
... Subtraction, 8
... Multiplication, 9
... Division, 13
Supplement to Multiplication and Division, 19
Contractions in Simple Multiplication, 21
Contractions in Simple Division, 23
Compound Numbers, 24
Reduction of Money, ib.
... Weights and Measures, 27
Tables of Money, Weights, and Measures, 34
Compound Addition, 36
... Subtraction, 37
... Multiplication, 38
... Division, 47
Supplement to Compound Multiplication and Division, 53
Questions on the Preceding Rules, 55
The Greatest Common Measure, 59
The Least Common Multiple, 60
Vulgar Fractions, 61
Reduction of Vulgar Fractions, ib.
Addition of Vulgar Fractions, 63
Subtraction of Vulgar Fractions, 65

PAGE
Multiplication of Vulgar Fractions, 66
Division of Vulgar Fractions, 67
Exercises in Vulgar Fractions, ib.
Simple Proportion, 69
Compound Proportion, 77
Practice, 79
Promiscuous Exercises, 94
Bills of Parcels, 96
Decimal Fractions, 97
Addition and Subtraction of Finite Decimals, ib.
Multiplication of Finite Decimals, 98
Division of Finite Decimals, 99
Reduction of Finite Decimals, ib.
Contractions in Decimals, 103
Exercises in Finite Decimals, 105
Interminate Decimals, 106
Reduction of Interminate Decimals, ib.
Addition and Subtraction of Interminate Decimals, 108
Multiplication of Interminate Decimals, 109
Division of Interminate Decimals, 111
Exercises in Decimal Fractions, 112
Allowances on Goods, 115
Commission and Brokerage, 118

PAGE
Insurance, ... 120
Calculation of Averages, . . 123
Simple Interest, ... 124
Accounts Current, . . . 130
Discount, ... 133
Stocks, ... 135
Equation of Payments, . 137
Profit and Loss, . . . 139
Promiscuous Exercises, . 141
Distributive Proportion, . . 143
Simple Fellowship, . . ib.
Compound Fellowship, . . 146
Exchange, ... 147
Arbitration of Exchange, . 151
Promiscuous Exercises in Exchange, ... 152
Alligation, ... 155
Alligation Medial, . . . ib.
Alligation Alternate, . . 156
Position, ... 158
Single Position, . . . ib.

PAGE
Double Position, . . . 158
Involution, ... 160
Evolution, ... 161
Extraction of the Square Root, ib.
Extraction of the Cube Root, 167
Extraction of any Root, . . 174
Series or Progressions, . . 179
Arithmetical Progression, . ib.
Geometrical Progression, . 180
Permutations and Combinations, ... 181
Compound Interest, . . 182
Annuities, ... 185
Annuities Certain, . . ib.
Contingent or Life Annuities, . 187
Promiscuous Exercises, . 194
Duodecimal Multiplication, . 196
Artificers' Measuring, . . 197
Exercises in Duodecimals, . 199
Miscellaneous Questions, . 202
Decimal Coinage, . . . 223

KEY

TO

MELROSE'S ARITHMETIC.

NUMERATION.

SIXTY-NINE; seventy-eight; fifty; six hundred and twenty; eight hundred and thirty-four; one hundred and fifty-seven; eight hundred and twenty-one; six hundred and eighteen; eighteen; seventy-one; thirty-four; one hundred and ninety-three; two hundred and thirteen; six hundred and forty-one; seven hundred and nine; eight hundred and forty-seven; one hundred and fourteen; six hundred and eleven; three hundred and one; five hundred and three; one hundred and seventy-one; one hundred and ten; three hundred and fourteen; one hundred and twenty-one; seven hundred and one; seven hundred and seventy-seven; five hundred and ten; nine hundred and ninety-nine.

Eight thousand, three hundred and forty-six; nine thousand and thirty-eight; five thousand, one hundred and nine; seventy-three thousand, six hundred and forty-two; one hundred thousand; six millions, seven hundred and fifty-four thousand, two hundred and eighty-three; sixty-seven millions, eight hundred and ninety thousand, one hundred; six billions, seven hundred millions, seven thousand, five hundred and eighty; forty-eight thousand and twenty; seven hundred and eighty-nine millions, four hundred and five thousand and thirty-seven; five trillions, one hundred and seven billions, four hundred and three millions, nine hundred and eighty-four thousand, six hundred and twenty-six; four billions, seven hundred and twenty millions, nine hundred and eighty-five thousand, one hundred and eleven; seventy millions, forty-two thousand and sixty-seven; five billions, seven hundred millions, six hundred and seventy thousand, eight hundred and fifty; one billion, four millions, fifteen thousand and twenty.

NOTATION.

57; 432; 607; 790; 4720; 58008; 100404; 70000000; 333004004; 9000004000.

ROMAN NOTATION.

7; 12; 18; 19; 40; 60; 80; 119; 800; 1815; 1832; 1865.

VI; XIV; XLIX; LXVIII; CCXCIV; MDCCCLXXII.

SIMPLE ADDITION.

ANSWERS.

1.	20828	13.	275849956926
2.	18031	14.	452986
3.	15220	15.	213207895
4.	16803	16.	1870302861
5.	24005	17.	48272491
6.	30888	18.	318769662
7.	37961	19.	54540
8.	27601	20.	55055
9.	413608	21.	69502121
10.	407219	22.	318725
11.	45293750	23.	190572575
12.	258329412	24.	244121066

1.	45293750	7.	364061525
2.	258329412	8.	910634531
3.	275849956926	9.	10202566290
4.	172486693	10.	715048145489126
5.	467607538	11.	8959706158610
6.	100615850	12.	9895185213043O

13. £8967
7456
7498
7538
78568
91034
9168
£210229

14. 7846
7384
7889
718
389
898
25124

15. £348
754
137
785
£2024

16. £934
121
515
454
£2024

17. £24034000
17155000
8994000
3150000
10567000
3650000
300000
2753560
£70603560

18. 2513
487
228
170
70
105
98
69
118
146
1864
5868

19. £296
413
754
217
87
23
173
33
£1996

20. £764
1000
55
801
1068
12111
10109
560
£26468

21. £4756
5785
5785
5785
3756
2982
2982
575
984
£33390

22. 6444531
608597
533917
7587045

23. 740 foot
564
498
722
826
679
734
504
5267 foot

294 horse
245
236
325
1100 horse

SIMPLE SUBTRACTION.

ANSWERS.

1.	3814	14.	1985846	27.	4676075
2.	1176	15.	34827583	28.	7788490
3.	471	16.	486792836	29.	90858897
4.	486	17.	5196382	30.	1006158
5.	462	18.	9182735	31.	3640615
6.	999	19.	8765433	32.	91063453
7.	47739	20.	85936428	33.	7369286
8.	44549	21.	8628475	34.	69968419
9.	171139	22.	347636	35.	1020256629
10.	5293750	23.	5497919	36.	71504814548
11.	23798657	24.	81726355	37.	999977689
12.	69147873734	25.	68004	38.	895970615861
13.	995896	26.	72486693	39.	989518521304

---

1. £6548
1874
£4674

2. 1864
1825
39 years

3. 1861
45
1816

4. £8118
789
£7329

5. £3113
219
£2894

6. 1841
1824
17 years

7. £437
981
988
754
3160
£899
1000
1899
£1261

8. Subtract 1519 from pres. ye. and add 604 to the result.

9. 3000
2513
487 ye.

10. Paid.
£177
379
539
467
1562

Due.
£436
893
1114
1000
£3443
1562
£1881

11. Paid.
£987
873
198
198
2256

Due.
£1781
1114
891
3786
2256
£1530

12. 1000000000
197848615
802151385

13. 5267 £.
928
456
248
1632
3635

1100 h.
230
212
96
538
562

14. 10874 ft.
3932
6942 ft.

15. 98605796
79638978
18966818

16. 247 yd.
349
199
Sold 795
1235
Left 440 yd.

17. 2854938000 ml.
36793000
2818145000 ml.

20. 1852
83
1769

18, 19, 21, 22. Subtract the dates in these examples from the present year.

SIMPLE MULTIPLICATION.

CASE I.

ANSWERS.

203670942860277
271561257147036
339451571433795
407341885720554
475232200007313

543122514294072
611012828580831
678903142867590
746793457154349
814683771441108

1. 235382517
156921678
1804599297

2. 3239501860
2429626395
27535765810

3. 4124976
2749984
31624816

4. 7317992
4573745
53055442

5. 6386715
4257810
48964815

6. 5512472
3149984
37012312

7. 52107210
28948450
341591710

8. 77552784
58164588
659198664

9. 2713828
4749199
50205818

10. 1728390
2765424
29382630

11. 6238459
802087655
864472245

12. 69748500

13. 47526192
27157824
2763308592

14. 823215411
731747032
73997918611

15. 3324391416
2493293562
7479880686
6648782832
7425028227636

16. 4597391112
2298695556
574673889
2873369445
2958421180572

17. 39481920
23689152
2408397120

18. 27398580
47947515
4822150080

19. 283945075
511101135
454312120
397523105
448349273425

20. 24198930
29038716
29062914930

21 29507480
4426122
5163809
6639183
72027758680

22. 423423445
677477512
592792823
508108134
574585614865

23. 85383864
75896768
66409672
67254023544

24. 48621111
55566984
62512857
68118176511

25. 392982195
550175073
628771512
235789317
707367951
7378240711125

26. 31578732
47368098
63157464
55262781
39473415
456817937112

27. 57174992
28587496
64321866
42881244
50028118
549937660552

28. 27384
54768
47922
27384
327512640000

29. 298776
74694
672246
448164
51643431600000

30. 61073514
54287568
47501622
40715676
33929730
3853670873940

31. 28584348
57168696
50022609
50594581803480

32. 3516584
4395730
7033168
6154022
2637438
326034810684

33. 3585540
6274695
7171080
5378310
5378310
59944850490

34. 264998300000

35.
$$\begin{array}{l} \quad 17430 \\ 27888 \\ \hline 296310000000 \end{array}$$

36.
$$\begin{array}{r} 50028118 \\ 42881244 \\ 28587496 \\ 7146874 \\ 64321866 \\ 7146874 \\ 57174992 \\ \hline 58543382524158 \end{array}$$

CASE II.

1.
$$\begin{array}{r} 7849687 \\ 2 \\ \hline 15699374 \\ 9 \\ \hline 141294366 \end{array}$$

2.
$$\begin{array}{r} 679148 \\ 6 \\ \hline 4074888 \\ 4 \\ \hline 16299552 \end{array}$$

3.
$$\begin{array}{r} 919078 \\ 11 \\ \hline 10109858 \\ 3 \\ \hline 30329574 \end{array}$$

4.
$$\begin{array}{r} 871498 \\ 11 \\ \hline 9586478 \\ 5 \\ \hline 47932390 \end{array}$$

5.
$$\begin{array}{r} 378548 \\ 7 \\ \hline 2649836 \\ 2 \\ \hline 5299672 \end{array}$$

6.
$$\begin{array}{r} 919068 \\ 5 \\ \hline 4595340 \\ 9 \\ \hline 41358060 \end{array}$$

7.
$$\begin{array}{r} 748969 \\ 12 \\ \hline 8987628 \\ 7 \\ \hline 62913396 \end{array}$$

8.
$$\begin{array}{r} 487496 \\ 4 \\ \hline 1949984 \\ 4 \\ \hline 7799936 \end{array}$$

9.
$$\begin{array}{r} 678912 \\ 50 \\ \hline 33945600 \end{array}$$

10.
$$\begin{array}{r} 786241 \\ 7 \\ \hline 5503687 \\ 7 \\ \hline 38525809 \end{array}$$

11.
$$\begin{array}{r} 972856 \\ 9 \\ \hline 8755704 \\ 9 \\ \hline 78801336 \end{array}$$

12.
$$\begin{array}{r} 456789 \\ 4 \\ \hline 1827156 \\ 7 \\ \hline 12790092 \end{array}$$

13.
$$\begin{array}{r} 987654 \\ 8 \\ \hline 7901232 \\ 8 \\ \hline 63209856 \end{array}$$

14.
$$\begin{array}{r} 357428 \\ 6 \\ \hline 2144568 \\ 8 \\ \hline 17156544 \end{array}$$

15.
$$\begin{array}{r} 9146374 \\ 12 \\ \hline 109756488 \\ 6 \\ \hline 658538928 \end{array}$$

16. 8098345
12
97180140
9
874621260

17. 6786348
7
47504436
4
190017744
4
760070976

18. 9687685
7
67813795
6
406882770
4
1627531080

---

1. 645
12
7740 sheaves

2. 59
5
295
9
2655 letters

3. £354
12
4248
8
£33984 legacy

4. £52
6
312
6
£1872

5. £134
6
804
12
£9648

6. 16
7
112
2
224 sq. ft.

7. 2640
7
18480 stones

8. 987
675000
4935
6909
5922
666225000 gr.

9. 365
156
2190
1825
365
56940

10. 10560
3
31680 sq. yd.

11. 21
9
189
14
756
189
2646

12. 56
6
336
365
1680
2016
1008
122640 ml.

13. 85
12
1020
15
5100
1020
15300 men

14. 1142
7
7994
8
63952 ft.

15. 365 da.
24
1460
730
8760 ho.
60
525600 min.

16. 195 ml.
93
585
1755
18135 ml.

17. 560
23
1680
1120
12880
42
25760
51520
540960
46
3245760
2163840
24884160 letters

SIMPLE DIVISION.

Case I.

1. 23 × 4 = 92
6 = 138
7 = 161
8 = 184
9 = 207
4 = 92
9 = 207
107615827

2. 17 × 4 = 68
9 = 153
5 = 85
1 = 17
08 = 136
8416836

3. 26 × 3 = 78
4 = 104
2 = 52
9 = 234
2 = 52
6 = 156
rem. = 8
8916084

4. 46 × 7 = 322
8 = 368
4 = 184
6 = 276
08 = 368
3 = 138
9 = 414
3609198594

5. 59 × 8 = 472
09 = 531
8 = 472
7 = 413
5 = 295
4 = 236
rem. = 38
477826524

6. 74 × 9 = 666
1 = 74
4 = 296
6 = 444
8 = 592
9 = 666
3 = 222
7 = 518
6768701338

7. 58 × 7 = 406
8 = 464
4 = 232
6 = 348
08 = 464
3 = 174
9 = 522
4550728662

8. 79 × 8 = 632
5 = 395
8 = 632
8 = 632
50 = 3950
rem. = 18
67849168

9. 85 × 9 = 765
1 = 85
4 = 340
6 = 510
8 = 680
9 = 765
3 = 255
7 = 595
7774859645

10. 89 × 3 = 267
9 = 801
2 = 178
3 = 267
2 = 178
4 = 356
4 = 356
rem. = 32
349168748

11. 97 × 9 = 873
1 = 97
4 = 388
6 = 582
8 = 776
9 = 873
3 = 291
7 = 679
8872486889

12. 99 × 9 = 891
1 = 99
4 = 396
6 = 594
8 = 792
9 = 891
3 = 297
7 = 693
9055424763

13. 98 × 7 = 686
6 = 588
3 = 294
9 = 882
7 = 686
3 = 294
rem. = 81
74869435

14. 809 × 6 = 4854
8 = 6472
01 = 809
8 = 6472
1 = 809
6 = 4854
rem. = 760
5502669904

15.
456 × 9 = 4104
1 = 456
4 = 1824
6 = 2736
8 = 3648
3 = 1368
7 = 3192
9 = 4104
5 = 2280
04 = 1824
41709581053824

16. 305 × 6 = 1830
7 = 2135
8 = 2440
9 = 2745
4 = 1220
5 = 1525
6 = 1830
2070784080

17. 897 × 8 = 7176
04 = 3588
5 = 4485
5 = 4485
4 = 3588
6 = 5382
4 = 3588
rem. = 220
72168551428

18. 475 × 2 = 950
4 = 1900
7 = 3325
5 = 2375
6 = 2850
7 = 3325
117594325

19. 689 × 3 = 2067
1 = 689
7 = 4823
6 = 4134
4 = 2756
9 = 6201
218860161

20. 3746 × 2 = 7492
7 = 26222
06 = 22476
9 = 33714
1 = 3746
5 = 18730
10140103590

21. 5682 × 1 = 5682
4 = 22728
7 = 39774
6 = 34092
7 = 39774
8 = 45456
839106396

22. $$\begin{array}{rl} 47269\times7= & 330883\\ 3= & 141807\\ 5= & 236345\\ 8= & 378152\\ 1= & 47269\\ \hline & 3478100289 \end{array}$$

23. $$\begin{array}{rl} 3709\times1= & 3709\\ 7= & 25963\\ 1= & 3709\\ 1= & 3709\\ \text{rem.}= & 3055\\ \hline & 6349154 \end{array}$$

24. $$\begin{array}{rl} 8778\times1= & 8778\\ 7= & 61446\\ 8= & 70224\\ 6= & 52668\\ \text{rem.}= & 913\\ \hline & 15678421 \end{array}$$

25. $$\begin{array}{rl} 87146\times8= & 697168\\ 9= & 784314\\ 9= & 784314\\ \text{rem.}= & 75424\\ \hline & 78419678 \end{array}$$

26. $$417396\left.\vphantom{\begin{array}{l}1\\1\\1\\1\end{array}}\right\}\times\left\{\begin{array}{rl} 7= & 2921772\\ 6= & 2504376\\ 4= & 1669584\\ 2= & 834792\\ 5= & 2086980\\ 8= & 3339168 \end{array}\right.$$
$$\overline{318998232168}$$

27. $$2719064\left.\vphantom{\begin{array}{l}1\\1\\1\\1\end{array}}\right\}\times\left\{\begin{array}{rl} 5= & 13595320\\ 6= & 16314384\\ 4= & 10876256\\ 8= & 21752512\\ 7= & 19033448\\ 3= & 8157192\\ 6= & 16314384 \end{array}\right.$$
$$\overline{15359274703104}$$

28. $$\begin{array}{rl} 67800\times1= & 678\\ 4= & 2712\\ 4= & 2712\\ 1= & 678\\ 7= & 4746\\ 1= & 678\\ \text{rem.}= & 6200\\ \hline & 9774800000 \end{array}$$

29. $$97000\left.\vphantom{\begin{array}{l}1\\1\\1\\1\end{array}}\right\}\times\left\{\begin{array}{rl} 1= & 97\\ 2= & 194\\ 07= & 679\\ 6= & 582\\ 8= & 776\\ 4= & 388\\ 9= & 873 \end{array}\right.$$
$$\overline{1171454353000}$$

30. $$\begin{array}{rl} 8700\times1= & 87\\ 4= & 348\\ 6= & 522\\ 0900= & 78300\\ \hline & 1270983000 \end{array}$$

31. $$24600\left.\vphantom{\begin{array}{l}1\\1\\1\end{array}}\right\}\times\left\{\begin{array}{rl} 2= & 492\\ 7= & 1722\\ 6= & 1476\\ 8000= & 1968000 \end{array}\right.$$
$$\overline{68092800000}$$

32. $$10746047\left.\vphantom{\begin{array}{l}1\\1\\1\end{array}}\right\}\times\left\{\begin{array}{rl} 4= & 42984188\\ 05= & 53730235\\ 0010= & 107460470\\ \text{rem.}= & 8596837 \end{array}\right.$$
$$\overline{435216064073307}$$

33. $$\begin{array}{rl} & \underbrace{804700625}\\ & \qquad\times\\ & \overbrace{}\\ 2= & 1609401250\\ 07= & 5632904375\\ 008= & 6437605000\\ 009= & 7242305625\\ \hline & 16657947422305625 \end{array}$$

CASES II. AND III.

ANSWERS.

1.
3919575231
1959787615$\frac{2}{4}$
1306525077
979893807$\frac{6}{8}$
783915046$\frac{2}{10}$
653262538$\frac{6}{12}$
2613050154
1567830092$\frac{2}{5}$
1119878637$\frac{3}{7}$
871016718
712650042

3. 48 { 6)85536
8)14256
1782

4. 72 { 8)149364
9)18670—4 } 36
2074—4

5. 144 { 12)28552
12)2379—4 } 40
198—3

6. 28 { 4)495368
7)123842—0 } 20
17691—5

7. 64 { 8)29304
8)3663—0 } 56
457—7

8. 81 { 9)835362
9)92818—0 } 9
10313—1

2.
3421376990
1710688495
1140458996$\frac{4}{6}$
855344247$\frac{1}{2}$
570229498$\frac{4}{12}$
622068543$\frac{7}{11}$
760305997$\frac{7}{9}$
977536282$\frac{6}{7}$
1368550796
2280917993$\frac{1}{3}$
684275398

9. 88 { 8)6908352
11)863544
78504

10. 108 { 9)97994448
12)10888272
907356

11. 121 { 11)470867628
11)42806148
3891468

12. 99 { 9)747781056
11)83086784
7553344

13. 72 { 6)56497608
12)9416268
784689

14. 16 { 4)2489765
4)622441—1 } 5
155610—1

15. 24 { 4)4879652
6)1219913—0 }
203318—5 } 20

16. 49 { 7)976854
7)139550—4 }
19935—5 } 39

17. 81 { 9)768945
9) 85438—3 }
9493—1 } 12

18. 154 { 2)6842738
7)3421369—0 }
11) 488767—0 }
44433—4 } 56

19. 343 { 7)8423786
7)1203398—0 }
7) 171914—0 }
24559—1 } 49

20. 168 { 4)10655400
6) 2663850
7) 443975
63425

---

1. 12) £5340
£445 each

2. 4465)3393400(760 pages
26790

3. 96 { 8)10656
12) 1332
111 trees

4. 52)£788(£15$\frac{2}{13}$ per wk.
268
8

5. 12)£4824
6)402
£67

6. 18)360
20 ft. long

7. 21 { 3)10941
7) 3647
521 herring

8. 789)6678885(8465
3668
5128
3945

9. 24 { 4)13990 miles
6) 3497—2 }
582—5 } $\frac{22}{24}$

10. 753)508275(675 times
5647
3765

SUPPLEMENT TO MULTIPLICATION AND DIVISION.

CASE I.

1. 8426
$4\frac{1}{2}$
4213
33704
37917

2. 7938
$6\frac{1}{3}$
2646
47628
50274

3. 678
$9\frac{3}{4}$
$\frac{1}{2} = 339$
$\frac{1}{4} = 169\frac{1}{2}$
6102
$6610\frac{1}{2}$

4. 897
$7\frac{2}{3}$
$\frac{1}{3} = 299$
$\frac{1}{3} = 299$
6279
6877

5. 627
$5\frac{1}{5}$
$125\frac{2}{5}$
3135
$3260\frac{2}{5}$

6. 983
$4\frac{1}{6}$
$163\frac{5}{6}$
3932
$4095\frac{5}{6}$

7. 749
$9\frac{5}{8}$
$\frac{1}{2} = 374\frac{1}{2}$
$\frac{1}{4} = 93\frac{5}{8}$
6741
$7209\frac{1}{8}$

8. 837
$14\frac{5}{6}$
$\frac{1}{2} = 418\frac{1}{2}$
$\frac{1}{3} = 279$
3348
837
$12415\frac{1}{2}$

9. 952
$19\frac{3}{8}$
$\frac{1}{4} = 238$
$\frac{1}{8} = 119$
8568
952
18445

10. 2)764
$12\frac{5}{9}$
9)382
$42\frac{4}{9}$
9168
$9592\frac{4}{9}$

11. 11)683
$62\frac{1}{11}$

12. 964
$10\frac{5}{12}$
$\frac{1}{3} = 321\frac{1}{3}$
$\frac{1}{12} = 80\frac{1}{3}$
9640
$10041\frac{2}{3}$

13. 7682352
$113\frac{7}{15}$
15)53776464
$3585097\frac{9}{15}$
23047056
7682352
7682352
$871690873\frac{9}{15}$

14. 6897235
$47\frac{5}{23}$
23)34486175
$1499398\frac{21}{23}$
48280645
27588940
$325669443\frac{21}{23}$

15.

2579368
$97\frac{16}{31}$
31)41269888
$1331286\frac{22}{31}$
18055576
23214312
$251529982\frac{22}{31}$

16.

4785652
$197\frac{6}{35}$
35)28713912
$820397\frac{17}{35}$
33499564
43070868
4785652
$943593841\frac{17}{35}$

CASE II.

1.

$4\frac{1}{2}$) 738472
2 2
9) 1476944
$164104\frac{8}{9}$

2.

$8\frac{1}{4}$) 689438
4 4
$33\begin{cases}3)2757752\\11)\;919250—2\end{cases}$
83568—2 $\Big\}$ 8

3.

$6\frac{1}{3}$) 946825
3 3
19) 2840475
$149498\frac{13}{19}$

4.

$7\frac{3}{4}$) 92746
4 4
31) 370984
$11967\frac{7}{31}$

5.

$10\frac{4}{5}$) 6789
5 5
$54\begin{cases}6)33945\\9)\;5657—3\end{cases}$
628—5 $\Big\}$ 33

6.

$11\frac{3}{8}$) 857943
8 8
91) 6863544
$75423\frac{51}{91}$

7.

$23\frac{3}{7}$) 829642
7 7
164) 5807494
$35411\frac{90}{164}$

8.

$365\frac{1}{4}$) 897538
4 4
1461) 3590152
$2457\frac{475}{1461}$

9.

$29\frac{5}{6}$) 678932
6 6
179) 4073592
$22757\frac{89}{179}$

10.

$17\frac{3}{16}$) 7682394
16 16
275) 122918304
$446975\frac{179}{275}$

11. $41\frac{5}{21}$) 4792654
21 21
866) 100645734
$116219\frac{80}{866}$

12. $13\frac{17}{47}$) 6543219
47 47
628) 307531293
$489699\frac{321}{628}$

CONTRACTIONS IN SIMPLE MULTIPLICATION.

1. 2)364820
182410

2. 2)4793500
2396750

3. 2)67839000
33919500

4. 2)627430
313715
941145

5. 2)6793800
3396900
10190700

6. 2)49276000
24638000
73914000

7. 4)738600
184650

8. 4)9472000
2368000

9. 4)679400
169850
509550

10. 4)39700
9925
29775

11. 2)827000
413500
1240500

12. 4)97400000
24350000
73050000

---

13. 7584
13
98592

14. 8573
17
145741

15. 4978
19
94582

16. 5496
104
571584

17. 3752
106
397712

18. 4286
115
492890

19. 7927
119
943313

20. 6375
112
714000

21. 7493
107
801751

22. 6538
14
91532

23. 6974
117
815958

24. 498
118
58764

25. 6753
1111
7502583

26. 7589
11111
84321379

27. 857
111
95127
3
285381

28. 764
11
8404
7
58828

29. 8564
111
950604
8
7604832

30. 37400
374
37026

31. 97000
97
96903

32. 7564
111
839604
4
3358416

33. 3970000
397
3969603

34. 2800000
28
2799972

35. 675
1111
749925
7
5249475

36. 56730000
11346
56718654

---

37. 270482
36189
2434338
4868676
9737352
9788473098

38. 978
4567
3912
4890
5868
6846
4466526

39. 6473
72364
25892
233028
466056
468412172

40. 578
96328
4624
18496
55488
55677584

41. 753
54279
6777
20331
40662
40872087

42. 543
56497
3801
26607
30408
30677871

43. 6742
8927
53936
60678
182034
60185834

44. 952
7648
5712
6664
45696
7280896

45. 9481
1728
9481
66367
265468
16383168

CONTRACTIONS IN SIMPLE DIVISION.

1. 378235
2
75647,0

2. 749382
2
3,0)149876,4
$49958\frac{24}{30}$

3. 4729864
4
189194,56

4. 5836142
2
7,0)1167228,4
$166746\frac{64}{70}$

5. 4738472
2
11,0)947694,4
$86154\frac{4}{110}$

6. 6794800
8
54358,400

7. 374964
4
3,00)14998,56
$4999\frac{156}{300}$

8. 496827
16
794,9232

9. 749386
2
9,0)149877,2
$16653\frac{2}{90}$

10. 946782
4
3787,128

11. 784396
2
27,0)156879,2
$5810\frac{92}{270}$

12. 493842
4
3,000)1975,368
$658\frac{1368}{3000}$

13. 126)483723
14)53747
$3839\frac{1}{14}$

14. 87)54723
29)18241(629
84
261

15, 416)75424
52)9428
13)2357
$181\frac{4}{13}$

16. 739428,647
739,428
,739
740168,815

17. 653,9482
653
654,0136

18. 75383,24616
,75383
75384,

19. 1. 648)5716428(8821
2. 1296 5324
3. 1944 1402
4. 2592 1068
5. 3240 420
6. 3888
7. 4536
8. 5184
9. 5832

20. 1. 5137)29137064(5672
2. 10274 34520
3. 15411 36986
4. 20548 10274
5. 25685
6. 30822
7. 35959
8. 41096
9. 46233

21. 1. 3475)4962840(1428
2. 6950 14878
3. 10425 9784
4. 13900 28340
5. 17375 540
6. 20850
7. 24325
8. 27800
9. 31275

22. 6789)5947382(876
51618
40952
218

23. 8153)285614(35
41024
259

24. 7916)571428(72
17308
1476

COMPOUND NUMBERS.

REDUCTION OF MONEY.

CASES I. AND II.

1. £4678567
20
93571340s.
12
1122856080d.
4
4)4491424320q.
12)1122856080d.
2,0)9357134,0s.
£4678567

2. 47864gu.
21
1005144s.
12
12061728d.
4
4)48246912q.
12)12061728d.
21{ 3)1005144s.
7) 335048
47864gu.

3. 7846cr.
78460sixd.
2
2)156920thd.
10)78460sixd.
7846cr.

4. £87496
4
349984cr.
10
10)3499840s.d.
4)349984cr.
£87496

5. £67, 18s.10¾d.
20
1358s.
12
16306d.
4)65227 qrs.
12)16306¾d.
2,0)135, 8s. 10¾d.
£67, 18s. 10¾d.

6. 17s. 0½d.
24
409 h. d.
2
2)818 qrs.
2)409 h. d.
12)204½d.
17s. 0½d.

7. 78468gu.
21
1647828s.
3
4943484f.d.
2
2)9886968t.d.
3)4943484f.d.
21 { 3)1647828s.
7) 549276
78468gu.

8. 8416h.gu.
21
176736 s. d.
12
2)2120832 h. d.
6)1060416 d.
21)176736 s. d.
8416h. gu.

9. 4746 fl.
2
9492 s.
12
113904 d.
4
4)455616 qr.
12)113904 d.
2)9492 s.
4746 fl.

10. 7849 fl.
2
15698 s.
12
188376 d.
2
2)376752 h. d.
12)188376 d.
2)15698 s.
7849 fl.

11. £78496
20
1569920 s.
3
4709760 f. d.
8
8)37678080 h. d.
3)4709760 f. d.
2,0)156992,0 s.
£78496

12.
£6784,18s.11½d.
20
135698 s.
12
1628387 d.
2
3256775 h. d.
6513550 qr.

CASE III.

1. 84620 gu.
21
5)1777020 s.
4)355404 cr.
£88851

2. £78914
4
315656 cr.
5
21)1578280 s.
75156 gu. 4s.

3. 914684 h. cr.
5
2)4573420 six d.
2)2286710 s.
1143355 fl.

4. 9146783 h. g.
21
4)192082443 six d.
48020610 fl. 3 s.d.

5. 714680 gu.
21
5)15008280 s.
4) 3001656 cr.
£750414

6. 87416835 fl.
2
5)174833670 s.
34966734 cr.
15
524501010 f. d.

7. 73156780 cr.
5
21)365783900s.
20)17418280 gu. 20s.
870914
£18289195

8. 3)41146788 f. d.
10½)13715596 s.
1306247 h. g. 2s. 6d.

9. £43500
4
174000 cr.
5
870000 s.
12
10440000 d.

10. 4200 cr.
5
21)21000 s.
1000 gu.
63000 f. d.

11. 42 gu. 17s. 8d.
21
899s.
3
7½)2699 f. d.
359 h. cr. 2s. 2d.

12. 7465 h. cr.
5
42)37325 s. d.
20)888 gu. 14s. 6d.
44 8 0
£933, 2s. 6d.

13. 628238 h. sov.
10
21)6282380 s.
299160 gu. 20s.

14. £46784966
20
10½)935699320 s.
89114220 h. g. 10s.

15. 726572648 h. gu.
10½
2,0)762901280,4s.
£381450640, 4s.

16. £526446
120
25)63173520 tw. d.
2526940 dols. 40d.

17. 339249 dol.
50
12)16962450d.
2,0) 141353,7s. 6d.
£70676, 17s. 6d.

18. 4526457 fl.
2
2,0)905291,4s.
£452645, 14s.
10½)9052914s.
862182 h. g. 3s.

19. 7487 gu.
21
5)157227s.
31445 cr. 2s.
30
943362 tw. d.

20. 10
5 £6784
1 40
16)271360 six d.
16960 pieces

21. 63498 h. gu.
10½
5)666729s.
133345 cr. 4s.

22. 896328 h. gu.
5¼
4705722 fl.

23. 57385 cr.
2
114770 h. cr.
5
42)573850 s. d.
13663 gu. 2s.

24. 71 gu.
3
213 gu.
21
5)4473 s.
894 cr. 3s.

25. 30
6
3 £1152
1 120
40)138240 tw. d.
3456 pieces

REDUCTION OF WEIGHTS AND MEASURES.

1. 20 cwt. = 1 ton
4
80 qr.
28
2240 lb.
16
35840 oz.
16
573440 dr.

2. 56 T. 17 cwt. 3 qr. 14 lb. 11 oz. 13 dr.
20
1137 cwt.
4
4551 qr.
28
127442 lb.
16
2039083 oz.
16
32625341 dr.

3. 34 cwt. 3 lb. 13 dr.
3811 lb.
60976 oz.
975629 dr.

4. 3 qr. 14 lb.
98 lb.
1568 oz.

5. 27 lb. 10 dr.
432 oz.
6922 dr.

6. 14 ton 15 oz.
280 cwt.
31360 lb.
501775 oz.

7. 16)674968749 oz.
28)42185546 lb. 13 oz.
4)1506626 qr. 18 lb.
2,0)37665,6 cwt. 2 qr.
18832 to. 16 cwt.

8. 16)914674 dr.
16)57167 oz. 2 dr.
28)3572 lb. 15 oz.
4)127 qr. 16 lb.
31 cwt. 3 qr.

9. 16)896784 dr.
16)56049 oz.
28)3503 lb. 1 oz.
4)125 qr. 3 lb.
31 cwt. 1 qr.

10. 16)98968 oz.
28)6185 lb. 8 oz.
220 qr. 25 lb.

11. 16)478698 dr.
16)29918 oz. 10 dr.
1869 lb. 14 oz.

12. 16)91474684 oz.
28)5717167 lb. 12 oz.
4)204184 qr. 15 lb.
2,0)5104,6 cwt. 0 qr.
2552 ton 6 cwt.

---

13. 12 oz. = 1 lb.
20
240 dwt.
24
5760 gr.

14. 484 lb. 11 oz. 17 dwt.
5819 oz. [23 gr.
116397 dwt.
2793551 gr.

15. 974 lb. 13 dwt.
233773 dwt.
5610552 gr.

16. 11 oz. 0 dwt. 21 gr.
220 dwt.
5301 gr.

17. 7 lb. 8 oz.
92 oz.

18. 15 lb. 3 dwt.
180 oz.
3603 dwt.
86472 gr.

19. 2,0)4608,0 dwt.
12)2304 oz.
192 lb.

20. 24)78968 gr.
2,0)329,0 dwt. 8 gr.
12)164 oz. 10 dwt.
13 lb. 8 oz.

21. 24)4919187 gr.
2,0)20496,6 dwt. 3 gr.
12)10248 oz. 6 dwt.
854 lb. 0 oz.

22. 24)487496 gr.
2,0)2031,2 dwt. 8 gr.
1015 oz. 12 dwt.

23. 12)74916874 oz.
6243072 lb. 10 oz.

24. 24)39168744 gr.
2,0)163203,1 dwt.
12)81601 oz. 11 dwt.
6800 lb. 1 oz.

25. 12 oz. = 1 lb.
96 dr.
288 scr.
5760 gr.

26. 689 lb. 17 gr.
8268 oz.
66144 dr.
198432 scr.
3968657 gr.

27. 784 lb. 4 oz.
9412 oz.
75296 dr.
225888 scr.

28. 3)786496 scr.
8)262165 dr. 1 scr.
12)32770 oz. 5 dr.
2730 lb. 10 oz.

29. 2,0)374193,5 gr.
3)187096 sc. 15 gr.
8)62365 dr. 1 scr.
12)7795 oz. 5 dr.
649 lb. 7 oz.

30. 8)9146874 dr.
12)1143359 oz. 2 dr.
95279 lb. 11 oz.

31. 7487 yd. 3 qr.
4
29951 qr.
4
119804 nl.

32. 49010 yd. 2 qr.
4
196042 qr.
9
1764378 in.

33. 4 yd. 2 qr. 3 nl.
18 qr.
75 nl.
150 h.nls.

34. 4)784680 nl.
4)196170 qr.
49042 yd. 2 qr.

35. 9)1764378 in.
4)196042 qr.
49010 yd. 2 qr.

36. 8)9416874 h.nls.
1177109 qr. 1 nl.

37. 78467 En. ells
5
4)392335
98083 yd. 3 qr.

38. 74875 Fl. ells
3
5)224625
44925 En. ells

39. 79684 Fl. ells
3
4)239052 qr.
59763 yd.

40. 914635 yd.
5)3658540 qr.
731708 En. ells

41. 8768949 Fr. ells
3)52613694 qr.
17537898 Fl. ells

42. 7469455 yd.
29877820 qr.
5975564 En. ells
4979636 Fr. ells 4 qr.

---

43. 3 mls.
8
24 fur.
40
960 pol.
5½
4800
480
5280 yds.
3
15840 ft.
12
190080 in.
12
2280960 ln.

44. 78916480496 ml.
8
631331843968 fur.
40
25253273758720 pol.
5½
138893005672960 yd.

45. 11 ml. 6 fur. 7 in.
94 fur.
20680 yd.
62040 ft.
744487 in.
8933844 ln.

46.
36)1330467780 in.
176,0)3695743,8 yd. 1 ft.
20998 ml. 958 yd.

47.
176,0)7891463891,4 yd.
44837863ml.34yd.

48. 36)30874968744 in.
176,0)85763802,0 yd. 2 ft.
487294 ml. 580 yd.

---

49. 4678 ac.
4
18712 ro.
40
748480 per.

50. 578 ac. 2 ro. 17 per.
4
2314 ro.
40
92577 per.

51. 784 ac. 8 per.
125448 per.
3794802 yd.

52. 478 ac. 3 ro. 18 per.
1915 ro.
76618 per.

53. 4,0)47896480,0 per
4)11974120 ro.
2993530 ac.

54. 4,0)98746894,6 per.
24686723ro.26per.

55.
30¼)4874168498 s. yd.
4,0)16112953,7 per.3¾yd.
4028238 ro. 17 per.

56.
9)4891467896 s. ft.
30¼)543496432 s. yd. 8. s. ft.
4,0)1796682,4 per. 6 s. yd.
4)449170 ro. 24 per.
112292 ac. 2. ro.

57. 294 sq. yd.
2646 sq. ft.
381024 sq. in.

58. 144)326592 s. in.
9)2268 s. ft.
252 s. yd.

59. 38 s. yd. 64 in.
342 s. ft.
49312 s. in.

60. 144)98624 s. in.
684 ft. 128 in.

61.
243 c. yd.
6561 c. ft.
11337408 cu. in.

62.
1728)13856832 c. in.
27)8019 c. ft.
297 cu. yd.

63.
4786798948069 c.in.
1000
277274)4786798948069000
gal. 17263785815

64.
67 bu. 5 gal. 5 pt.
541 gal.
4333 pt.

65.
141 bu. 3 pk.
567 pk.
4536 qt.

66.
8)93598 gal. 1 qt.
8)11699 bu. 3 pk.
1462 qr. 3 bu.

67.
2)137433 gal. 3 qts.
32)68716 pk. 1 gal.
2147 qr. 3 bu.

68.
7 cir. 45′ 38″
151245′
9074738″

69.
6,0)626,3′ 27″
3,0)10,4° 23′
3s. 14°

70.
490° 53″
29400′
1764053″

71.
679° 31′ 47″
40771′
2446307″

72.
1728)748693 c. in.
27)433 c. ft. 469 c. in.
16 c. yd. 1 c. ft.

73.
73 c. yd. 7 ft. 1035 in.
1978 c. ft.
3419019 c. in.

74.
64238500 gal.
277274
1,000)17811665849,000
17811665849 c. in.

75.
784 qrs. 3 pk.
25091 pk.
50182 gal.

76.
2)200710 gal.
4)100355 pk.
8)25088 bu. 3 pk.
3136 qr. 0 bu.

77. 4783 qr.7bu.3pk.1ga.
38271 bu. [7 pt.
153087 pk.
306175 gal.
2449407 pt.

78. 8)878468 pt.
8)109808 gal. 4 pt.
8)13726 bu. 0 gal.
1715 qr. 6 bu.

---

79. 23 mo. 29 da. 23 ho.
30 [59″
719 da.
24
17279 ho.
60
1036740′
60
62204459″

80. 365 da. 6 ho.
24
8766 ho.

81. 365 da. 5 ho. 48′ 50″
8765 ho.
525948 min.
31556930 sec.
1893415800 thir.

82. 365 da. 6 ho.
8766 ho.
525960 min.
31557600 sec.

83.
6,0)1136049755,4‴
6,0)18934162,5″ 54‴
6,0)315569,3′ 45″
24)52594 ho. 53′
365)2191 da.10 ho.
6 ye. 1 da.

84. Multiply 31556930 sec. in a Solar year by the present year.

85.
1,00)10000000,00
6,0)1000000,0 min.
24)166666 ho. 40 min.
365¼) 6944 da. 10 ho.
1461) 27776
19 Ju. ye. 4¼ da.

86. 91718000 ml.
5280
1,000)484271040,000 ft.
6,0)48427104,0″
6,0)807118,4′
24)134519 ho. 44′
365¼)5604 d.23ho.
15Ju.ye.125¼da.

TABLES OF MONEY, WEIGHTS, AND MEASURES.

MONEY TABLE.

qr.	d.			
4	1	sh.		
48	12	1	cr.	
240	60	5	1	£
960	240	20	4	1

AVOIRDUPOIS *or* COMMERCIAL WEIGHT.

dr.	oz.				
16	1	lb.			
256	16	1	qr.		
7168	448	28	1	cwt.	
28672	1792	112	4	1	to.
573440	35840	2240	80	20	1

TROY *or* GOLD AND SILVER WEIGHT.

gr.	dwt.		
24	1	oz.	
480	20	1	lb.
5760	240	12	1

APOTHECARIES' WEIGHT.

gr.	scr.			
20	1	dr.		
60	3	1	oz.	
480	24	8	1	lb.
5760	288	96	12	1

CLOTH MEASURE.

in.	nl.		
2¼	1	qr.	
9	4	1	yd.
36	16	4	1

LINEAL MEASURE.

lin.	in.					
12	1	ft.				
144	12	1	yd.			
432	36	3	1	pol.		
2376	198	16½	5½	1	fur.	
95040	7920	660	220	40	1	ml.
760320	63360	5280	1760	320	8	1

SQUARE *or* SUPERFICIAL MEASURE.

sq. in.	sq. ft.				
144	1	sq. yd.			
1296	9	1	per.		
39204	272¼	30¼	1	ro.	
1568160	10890	1210	40	1	ac.
6272640	43560	4840	160	4	1

MEASURE OF CAPACITY.

cu. in.	pt.					
34·659	1	qt.				
69·318	2	1	gal.			
277·274	8	4	1	pk.		
554·548	16	8	2	1	bu.	
2218·191	64	32	8	4	1	qr.
17745·526	512	256	64	32	8	1

TIME.

sec.	min.					
60	1	ho.				
3600	60	1	day			
86400	1440	24	1	wk.		
604800	10080	168	7	1	mo.	
2419200	40320	672	28	4	1	ye.
31536000	525600	8760	365	$52\frac{1}{7}$	$13\frac{1}{28}$	1

EXERCISES UNDER THE NOTE.

1. 20)720 guineas
36
£756

2. 4)964 En. ells
241
1205 yards.

3. 36)6768 Sc. ells
188
6956 yards.

4. 21)£840
40
800 gu.

5. 5)765 yd.
153
612 En. ells

COMPOUND ADDITION.

ANSWERS.

	£	s.	d.		£	s.	d.
1.	343	0	4	8.	4825	5	9¾
2.	1470	9	11½	9.	70395	5	6
3.	2688	8	0	10.	55862	0	4
4.	3824	3	3¾	11.	50650	6	5¾
5.	63	16	2	12.	99153	10	2¼
6.	66	2	1¼	13.	320717	5	11
7.	928	8	9	14.	1952045	4	1¼

15. 306 tons, 18 cwt. 3 qr.
16. 135 lb. 5 oz. 15 dr.
17. 268 ct. 3 q. 13 lb. 12 oz. 3 dr.
18. 287 lb. 7 oz. 15 dwt. 14 gr.
19. 105 lb. 6 oz. 5 dwt. 13 gr.
20. 49 lb. 7 dr. 2 scr,
21. 46 yd. 2 qr. 3 nl.
22. 38 le. 1 ml. 3 fur. 35 po.
23. 118 po. 3 yd. 2 ft. 10 in.
24. 120 ac. 9 per.
25. 48 ac. 29 per. 10¼ yd.
26. 80 qr. 4 bu. 3 pk.
27. 25 pk. 1 ga. 3 qt.
28. 364 bu. 1 pk. 1 gal. 3 qt.
29. 308 qr. 7 bu.
30. $87^{s}\ 21^{\circ}\ 32'\ 28''$
31. 271 ho. 8 min. 45 sec.
32. 902 da. 8 ho. 37 min.
33. 3797 co. ye. 40 d. 23 h. 1 m.
34. 473 Ju. ye. 338 da.
35. £4270, 1s. 0d.
36. £3516, 12s. 11d.
37. 2862 yd. 1 qr. 1 nl.
38. £12, 6s. 5¼d.
39. 3296 18 8¼
40. 764 9 0

41. £966, 2s. 5d.
42. 3223 18 11
43. 8884 1 7
44. 11169 cwt. 1 qr. 14 lb. 1 oz. 14 drs.
45. £1750, 4s. 3d.
46. 77 lb. 8 dwt. 18 gr.
47. 3721 ac. 2 ro. 10 per.
48. £281, 5s. 4d.
49. £39338, 16s. 6½d.

COMPOUND SUBTRACTION.

ANSWERS.

	£	s.	d.		£	s.	d.
1.	9	8	10	6.	4738	17	2
2.	8	17	5	7.	3109	0	11
3.	94	15	5¾	8.	7148	11	8½
4.	816	17	8½	9.	9148	11	9¼
5.	17846	17	8	10.	87191	11	7½

11. 56 c. 3 qr. 26 lb. 14 oz.
12. 8 yd. 3 qr. 1 nl. [14 dr.
13. 58 lb. 11 oz. 15 dw. 18 gr.
14. 4 lb. 11 oz. 7 dr. 2 sc. 11 gr.
15. 8 qr. 3 bu. 2 pe. 1 ga. 7 pt.
16. 14 ml. 7 fur. 34 po. 4 yd. 2 ft. 11 in.
17. 7 ac. 1 ro. 18 per. 15 yd.
18. 47 Ju. ye. 260¼ da. 1 ho. 48 min.

19. Estate, £6478, 13s. 8½d.
Debts, 517 19 4¾
Net stock, £5960, 14s. 3¾d.

20. Bor. £1462, 5s. 0d.
Paid, 644 7 6
Due, £817, 17s. 6d.

21. Debts, £7338, 6s. 2½d.
Effects, 4143 4 9½
Defect, £3195, 1s. 5d.

22. Estate, £2988, 7s. 7d.
Debts, 1232 10 4
Stock, £1755, 17s. 3d.

23. Purch. 89 lb. 7 oz. 3d. 3g.
Sold, 89 5 19 15
Rem. 1 oz. 3d. 12g.

24. Deliv. 32 lb. 0 oz. 0d. 0g.
Rec. 29 6 4 21
Bowl, 2 lb. 5 oz. 15d. 3g.

25. Bot. 14c. 2q. 20 lb. 0 oz. 0d.
Sold, 11 1 8 9 2
Unsold, 3c. 1q. 11 lb. 6 oz. 14d.

26. Debts, £1272, 7s. 1½d.
Paid, 838 8 3
Due, £433, 18s. 10½d.

27. Estate, 3465 ac. 0 ro.
Let, 3199 1
In hand, 265 ac. 3 ro.

28. Bot. 347 hhd. 41 gal.
Sold, 240 38
Unsold, 107 hhd. 3 gal.

29. Made, 197hhd. 17gal. 0pt.
Sold, 116 16 4
In cellar, 81hhd. 0gal. 4pt.

30. Collected, £4122, 19s. 6d.
Expenses, 445 0 0
Net rev. £3677, 19s. 6d.

31. Debts, £5462, 2s. 0d.
Paid, 2022 4 5
Unpaid, £3439, 17s. 7d.

32. Gross, 67 cwt. 1 qr. 20 lb.
Tare, 7 0 0
Net, 60 cwt. 1 qr. 20 lb.

33. Gross, 257 cwt. 0 qr. 25 lb.
Tare, 8 3 15
Net, 248 cwt. 1 qr. 10 lb.

34\.

	£	s.	d.		£	s.	d.		£	s.	d.
A, B, & C,	89	19	7½		89	19	7½	A & B,	64	6	7¾
A & B,	64	6	7¾	B & C,	55	10	10	A,	34	8	9½
C,	25	12	11¾	A,	34	8	9½	B,	29	17	10¼

35. 20)495 guin.
24, 15s.
£519, 15s. 0d.
387 12 8¼
£132, 2s. 3¾d.

36. £375, 6s. 0d.
262 17 6¾
£112, 8s. 5¼d.

COMPOUND MULTIPLICATION.

Case I.

Answers.

	£	s.	d.		£	s.	d.		£	s.	d.
1.	12	19	10½	7.	132	16	0½	13.	840	11	6
2.	37	13	5	8.	0	4	4¼	14.	803	7	4
3.	449	13	9	9.	60	2	6	15.	9	16	8
4.	6	1	2¼	10.	87	0	3¾	16.	491	17	0
5.	144	7	4	11.	3	7	4½	17.	812	15	0¼
6.	159	15	2¼	12.	198	3	10¾	18.	695	8	0

19. 68 cwt. 3 qr. 22 lb.
20. 174 lb. 2 oz. 7 dr.
21. 219 lb. 8 oz. 10 dwt. 12 gr.
22. 899 lb. 8 oz. 4 dr.
23. 151 tons, 2 cwt.
24. 79 lb. 1 oz. 15 dr.
25. 79 lb. 8 oz. 9 dwt. 6 gr.
26. 381 ml. 9 po. 4½ yd.
27. 24799 gallons
28. 23 bu. 1 pk. 6 pt.

29. 221 qr. 7 bu. 1 pk.
30. 31 ye. 5 mo. 21 da.
31. 21 da. 15 ho. 50 min.
32. 134 ac. 3 ro. 31 per.
33. 94 ac. 1 ro. 34 per.
34. 4382 da. 21 ho. 47 m. 24 s.
35. 50103 gal. 2 qt. 1 pt.
36. 35872 gal. 2 qt.
37. 2645 per. 28¾ s. yd. 8 s. ft.

CASE II.

		£	s.	d.
1.	6 times =	378	4	4½
	18 〃 =	1134	13	1½
2.	10 times =	175	16	10½
	20 〃 =	351	13	9
3.	6 times =	83	2	3
	36 〃 =	498	13	6
4.	9 times =	251	2	0
	45 〃 =	1255	10	0
5.	8 times =	7	3	6
	56 〃 =	50	4	6
6.	12 times =	0	10	9
	72 〃 =	3	4	6
7.	6 times =	142	10	0
	24 〃 =	570	0	0
8.	10 times =	150	6	8
	30 〃 =	451	0	0
9.	6 times =	82	15	9
	42 〃 =	579	10	3

		£	s.	d.
10.	6 times =	103	4	0
	48 〃 =	825	12	0
11.	10 times =	546	10	2½
	60 〃 =	3279	1	3
12.	12 times =	11	19	9
	84 〃 =	83	18	3
13.	4 times =	63	15	9
	16 〃 =	255	3	0
14.	6 times =	224	2	0
	36 〃 =	1344	12	0
15.	8 times =	59	11	10
	88 〃 =	655	10	2
16.	12 times =	100	16	0
	108 〃 =	907	4	0
17.	12 times =	234	16	0
	144 〃 =	2817	12	0
18.	4 times =	69	0	0
	24 〃 =	414	0	0
	168 〃 =	2898	0	0

19.		cwt.	qr.	lb.
	3 times =	113	2	20
	15 〃 =	568	1	16

20.		lb.	oz.	dr.
	6 times =	102	5	10
	24 〃 =	409	6	8

21.		lb.	oz.	dwt.	gr.
7 times	=	147	4	15	23
77 〃	=	1621	4	15	13

22.		ac.	ro.	per.
4 times	=	226	0	36
28 〃	=	1583	2	12

23.		mls.	fur.	pol.
6 times	=	166	5	14
54 〃	=	1500	0	6

24.		yd.	qr.	nl.
7 times	=	263	3	1
63 〃	=	2374	1	1

CASE III.

			£	s.	d.
1.	4 times	=	13	8	1
	16 〃	=	53	12	4
	1 〃	=	3	7	0¼
	17 〃	=	56	19	4¼
2.	2 times	=	8	0	7
	22 〃	=	88	6	5
	1 〃	=	4	0	3½
	23 〃	=	92	6	8½
3.	4 times	=	28	0	3
	40 〃	=	280	2	6
	1 〃	=	7	0	0¾
	41 〃	=	287	2	6¾
4.	10 times	=	3	16	10½
	50 〃	=	19	4	4½
	1 〃	=	0	7	8¼
	51 〃	=	19	12	0¾
5.	10 times	=	185	13	4
	50 〃	=	928	6	8
	3 〃	=	55	14	0
	53 〃	=	984	0	8
6.	10 times	=	779	0	2½
	60 〃	=	4674	1	3
	—1 〃	=	77	18	0¼
	59 〃	=	4596	3	2¾

			£	s.	d.
7.	6 times	=	383	6	0
	18 〃	=	1149	18	0
	1 〃	=	63	17	8
	19 〃	=	1213	15	8
8.	4 times	=	214	14	11
	40 〃	=	2147	9	2
	—1 〃	=	53	13	8¾
	39 〃	=	2093	15	5¼
9.	12 times	=	8	16	3
	48 〃	=	35	5	0
	—1 〃	=	0	14	8¼
	47 〃	=	34	10	3¾
10.	8 times	=	7	15	0
	56 〃	=	54	5	0
	1 〃	=	0	19	4½
	57 〃	=	55	4	4½
11.	8 times	=	501	9	4
	56 〃	=	3510	5	4
	2 〃	=	125	7	4
	58 〃	=	3635	12	8
12.	12 times	=	227	8	0
	60 〃	=	1137	0	0
	1 〃	=	18	19	0
	61 〃	=	1155	19	0

13.		£	s.	d.
6 times	=	466	0	0
66 〃	=	5126	0	0
2 〃	=	155	6	8
68 〃	=	5281	6	8

14.		£	s.	d.
12 times	=	398	14	0
72 〃	=	2392	4	0
2 〃	=	66	9	0
74 〃	=	2458	13	0

15.		£	s.	d.
10 times	=	143	10	0
80 〃	=	1148	0	0
2 〃	=	28	14	0
82 〃	=	1176	14	0

16.		lb.	oz.	dwt.	gr.
12 times	=	208	10	11	12
24 〃	=	417	9	3	0
2 〃	=	34	9	15	6
26 〃	=	452	6	18	6

17.		cwt.	qr.	lb.	oz.
12 times	=	263	1	9	0
36 〃	=	789	3	27	0
1 〃	=	21	3	21	12
37 〃	=	811	3	20	12

18.		ml.	fu.	po.	yd.
9 times	=	168	1	8	3
45 〃	=	840	6	2	4
2 〃	=	37	2	37	2½
47 〃	=	878	1	0	1

19.		yd.	qr.	nl.	in.
12 times	=	428	3	2	1½
60 〃	=	2144	2	1	0¾
−1 〃	=	35	2	3	2
59 〃	=	2108	3	1	1

20.		ac.	ro.	per.	yd.
10 times	=	449	2	35	18¾
70 〃	=	3148	0	9	10¼
1 〃	=	44	3	35	17
71 〃	=	3193	0	4	27¼

21.		qr.	bu.	pk.	ga.
10 times	=	547	2	3	0
90 〃	=	4926	0	3	0
3 〃	=	164	1	2	1
93 〃	=	5090	2	1	1

CASE IV.

1.	£	s.	d.			£	s.	d.		
	57	18	9½	× 8	=	463	10	4	=	8 times
	579	7	11	× 4	=	2317	11	8	=	40 〃
	5793	19	2	× 3	=	17381	17	6	=	300 〃
						20162	19	6	=	348 〃

	£	s.	d.		£	s.	d.		
2.	99	13	6	× 9 =	897	1	6	=	9 times
	996	15	0	× 6 =	5980	10	0	=	60 〃
	9967	10	0	× 4 =	39870	0	0	=	400 〃
	99675	0	0	× 3 =	299025	0	0	=	3000 〃
					345772	11	6	=	3469 〃
3.	84	13	9	× 0					
	846	17	6	× 6 =	5081	5	0	=	60 times
	8468	15	0	× 6 =	50812	10	0	=	600 〃
	84687	10	0	× 4 =	338750	0	0	=	4000 〃
					394643	15	0	=	4660 〃
4.	1	15	0½	× 1 =	1	15	0½	=	1 time
	17	10	5	× 4 =	70	1	8	=	40 times
	175	4	2	× 8 =	1401	13	4	=	800 〃
	1752	1	8	× 7 =	12264	11	8	=	7000 〃
					13738	1	8½	=	7841 〃
5.	77	11	4¼	× 2 =	155	2	8½	=	2 times
	775	13	6½	× 5 =	3878	7	8½	=	50 〃
	7756	15	5	× 3 =	23270	6	3	=	300 〃
	77567	14	2	× 6 =	465406	5	0	=	6000 〃
					492710	1	8	=	6352 〃
6.	79	19	8	× 2 =	159	19	4	=	2 times
	799	16	8	× 0					
	7998	6	8	× 0					
	79983	6	8	× 0					
	799833	6	8	× 1 =	799833	6	8	=	10000 〃
					799993	6	0	=	10002 〃
7.	137	18	4½	× 1 =	137	18	4½	=	1 time
	1379	3	9	× 4 =	5516	15	0	=	40 times
	13791	17	6	× 1 =	13791	17	6	=	100 〃
	137918	15	0	× 1 =	137918	15	0	=	1000 〃
					157365	5	10½	=	1141 〃

	£	s.	d.		£	s.	d.		
8.	15	18	3	× 3 =	47	14	9	=	3 times
	159	2	6	× 7 =	1113	17	6	=	70 〃
	1591	5	0	× 6 =	9547	10	0	=	600 〃
					10709	2	3	=	673 〃

9.	18	11	11	× 5 =	92	19	7	=	5 times
	185	19	2	× 4 =	743	16	8	=	40 〃
	1859	11	8	× 1 =	1859	11	8	=	100 〃
	18595	16	8	× 9 =	167362	10	0	=	9000 〃
					170058	17	11	=	9145 〃

10.	6	7	8	× 2 =	12	15	4	=	2 times
	63	16	8	× 3 =	191	10	0	=	30 〃
	638	6	8	× 6 =	3830	0	0	=	600 〃
					4034	5	4	=	632 〃

11.	4	18	9½	× 1 =	4	18	9½	=	1 time
	49	7	11	× 6 =	296	7	6	=	60 times
	493	19	2	× 5 =	2469	15	10	=	500 〃
					2771	2	1½	=	561 〃

12.	7	11	11¾	× 3 =	22	15	11¼	=	3 times
	75	19	9½	× 2 =	151	19	7	=	20 〃
	759	17	11	× 4 =	3039	11	8	=	400 〃
					3214	7	2¼	=	423 〃

			£	s.	d.
1.	2 cwt.	=	5	1	3
	14 〃	=	35	8	9
2.	7 stones	=	6	10	6¼
3.	11 lb.	=	7	7	4¼
4.	12 yd.	=	10	12	6

			£	s.	d.
5.	3 stones	=	1	9	8¼
	15 〃	=	7	8	5¼
6.	6 stones	=	3	5	7½
	18 〃	=	9	16	10½
7.	6 oz.	=	1	12	7½
	36 〃	=	9	15	9
	1 〃	=	0	5	5¼
	37 〃	=	10	1	2¼

			£	s.	d.
8.	10 cwt.	=	12	7	1
	20 〃	=	24	14	2
9.	4 sets	=	7	1	7
	24 〃	=	42	9	6
10.	3 sheep	=	6	17	4½
	27 〃	=	61	16	4½
11.	8 yd.	=	11	1	8
	56 〃	=	77	11	8
	1 〃	=	1	7	8½
	57 〃	=	78	19	4½
12.	8 yd.	=	19	10	4
	32 〃	=	78	1	4
13.	10 yd.	=	17	17	11
	50 〃	=	89	9	7
	1 〃	=	1	15	9½
	51 〃	=	91	5	4½
14.	5 casks	=	14	7	8½
	35 〃	=	100	13	11½
15.	10 casks	=	36	9	4½
	40 〃	=	145	17	6
16.	7 cwt.	=	20	11	3
	77 〃	=	226	3	9
	—1 〃	=	2	18	9
	76 〃	=	223	5	0
17.	9 cwt.	=	11	1	7½
	45 〃	=	55	8	1½
18.	10 bales	=	37	3	11½
	60 〃	=	223	3	9

			£	s.	d.
19.	6 bales	=	11	5	3
	66 〃	=	123	17	9
	—1 〃	=	1	17	6½
	65 〃	=	122	0	2½
20.	12 bar.	=	33	4	6
	72 〃	=	199	7	0
21.	10 bar.	=	18	14	7
	80 〃	=	149	16	8
	2 〃	=	3	14	11
	82 〃	=	153	11	7
22.	12 stones	=	2	17	9
	84 〃	=	20	4	3
	1 〃	=	0	4	9¾
	85 〃	=	20	9	0¾
23.	7 score	=	61	7	7½
	35 〃	=	306	18	1½
24.	10 weeks	=	7	5	5
	50 〃	=	36	7	1
	2 〃	=	1	9	1
	52 〃	=	37	16	2
25.	8 yd.	=	3	17	6
26.	9 yd.	=	5	3	1½
27.	6 yd.	=	10	19	9
	42 〃	=	76	18	3
28.	8 yd.	=	5	15	0
	56 〃	=	40	5	0
29.	10 yd.	=	9	13	6½
	40 〃	=	38	14	2

£ s. d.

30. 9 yd. = 2 9 6
99 ″ = 27 4 6

31. 6 lb. = 4 0 3
42 ″ = 28 1 9

32. 10 hhd. = 32 7 1
30 ″ = 97 1 3
1 ″ = 3 4 8½
31 ″ = 100 5 11½

33. 3 pipes = 37 5 6
33 ″ = 410 0 6

34. 12 pun. = 307 12 0
84 ″ = 2153 4 0
—1 ″ = 25 12 8
83 ″ = 2127 11 4

35. 12 yd. = 2 17 6
96 ″ = 23 0 0
1 ″ = 0 4 9¼
97 ″ = 23 4 9¼

36. 3 yd. = 0 10 9
21 ″ = 3 15 3

37. 7 yd. = 4 4 5¼
77 ″ = 46 8 9¾

38. 12 lb. = 9 6 6
72 ″ = 55 19 0
1 ″ = 0 15 6½
73 ″ = 56 14 6½

39. 9 bar. = 37 12 7½
99 ″ = 413 18 10½

£ s. d.

40. 8 bar. = 15 17 8
72 ″ = 142 19 0
3 ″ = 5 19 1½
75 ″ = 148 18 1½

41. 6 lb. = 1 7 0
42 ″ = 9 9 0
336 ″ = 75 12 0

42. 8 yd. = 1 18 0
88 ″ = 20 18 0
—1 ″ = 0 4 9
87 ″ = 20 13 3

43. 10 yd. = 3 10 5
50 ″ = 17 12 1
350 ″ = 123 4 7

44. 10 lb. = 0 15 7½
90 ″ = 7 0 7½
—1 ″ = 0 1 6¾
89 ″ = 6 19 0¾

45. 10 yd. = 21 19 4½
90 ″ = 197 14 4½
450 ″ = 988 11 10½

46. 12 stones = 8 15 0
96 ″ = 70 0 0
—1 ″ = 0 14 7
95 ″ = 69 5 5

47. 10 stones = 16 19 2
100 ″ = 169 11 8
2 ″ = 3 7 10
102 ″ = 172 19 6

48.

	£	s.	d.
10 score =	42	10	0
30 〃 =	127	10	0
—1 〃 =	4	5	0
29 〃 =	123	5	0

49.

	cwt.	qr.	lb.	oz.	dr.
8 hhd. =	53	0	24	6	8
48 〃 =	319	1	6	7	0
—1 〃 =	6	2	17	0	13
47 〃 =	312	2	17	6	3

50.

	lb.	oz.	dwt.
12 ingots =	35	10	4
96 〃 =	286	9	12
2 〃 =	5	11	14
98 〃 =	292	9	6

51.

	lb.	oz.	dwt.	gr.
9 pieces =	32	9	10	21
45 〃 =	163	11	14	9

52.

	lb.	oz.	dr.	gr.
7 parcels =	13	4	5	19

53.

	lb.	oz.	dwt.	gr.
6 guin. =	0	1	12	6
54 〃 =	1	2	10	6
486 〃 =	10	10	12	6

54.

	po.	yd.	ft.	in.
10 days =	20	2	2	4
40 〃 =	82	0	0	4
—1 〃 =	1	5	2	4
39 〃 =	79	5	1	0

55.

	ac.	ro.	pe.	yd.
9 farms =	428	1	5	19

56.

	qr.	bu.	pk.
9 days =	13	1	3
63 〃 =	92	4	1
315 〃 =	462	5	1
—2 〃 =	2	7	2
313 〃 =	459	5	3

57.

	ga.	qt.	pt.
5 days =	5011	3	1
40 〃 =	40095	0	0
360 〃 =	360855	0	0
5 〃 =	5011	3	1
365 〃 =	365866	3	1

58.

	ga.	qt.	pt.
5 days =	126579	1	1
40 〃 =	1012635	0	0
360 〃 =	9113715	0	0
5 〃 =	126579	1	1
365 〃 =	9240294	1	1

59.

	ml.	fu.	po.
6 days =	226	0	28
42 〃 =	1582	4	36
1 〃 =	37	5	18
43 〃 =	1620	2	14

60.

	ye.	mo.	da.
9 hours =	17	11	$25\frac{1}{8}$

COMPOUND DIVISION.

CASE I.

1. 17) £18, 7s. 6d. (£1
1
27s. (1s.
10
126d. (7d.
7
28f. ($\frac{1}{4}$d. $\frac{11}{17}$
11

2. 23) £27, 12s. (£1
4
92s. (4s.

3. 26) £10, 8s. 6$\frac{1}{2}$d. (£0
208s. (8s.
6d. (0d.
26f. ($\frac{1}{4}$d.

4. 31) £17, 1s. 7$\frac{3}{4}$d. (£0
341s. (11s.
7d. (0d.
31f. ($\frac{1}{4}$d.

5. 43) £38, 2s. 4$\frac{1}{4}$d. (£0
762s. (17s.
332
31
376d. (8d.
32
129f. ($\frac{3}{4}$d.

6. 38) £167, 7s. 7d. (£4
15
307s. (8s.
3
43d. (1$\frac{5}{38}$d.
5

7. 65) £418, 13s. 4d. (£6
28
573s. (8s.
53
640d. (9d.
55
220f. ($\frac{3}{4}$d. $\frac{25}{65}$
25

8. 69) £999, 18s. 6d. (£14
309
33
678s. (9s.
57
690d. (10d.

9. 71) £341, 16s. 8$\frac{1}{2}$d. (£4
57
1156s. (16s.
446
20
248d. (3d.
35
142f. ($\frac{1}{2}$d.

10. 74) £488, 15s. 8½d. (£6
44
895s. (12s.
7
92d. (1d.
18
74f. (¼d.

11. 78) £500, 18s. 1½d. (£6
32
658s. (8s.
34
409d. (5d.
19
78f. (¼d.

12. 87) £931, 19s. 9d. (£10
61
1239s. (14s.
21
261d. (3d.

13. 89) £478, 13s. 0¾d. (£5
33
673s. (7s.
50
600d. (6d.
66
267f. (¾d.

14. 79) £118, 15s. 7d. (£1
39
795s. (10s.
5
67d. (0d.
268f. (¾d. $\frac{31}{79}$
31

15. 97) £918, 17s. 5½d. (£9
45
917s. (9s.
44
533d. (5d.
48
194f. (½d.

16. 98) £1118, 13s. 6d. (£11
40
813s. (8s.
29
354d. (3d.
60
240f. (½d. $\frac{44}{98}$
44

17. 104) £332, 18s. 2d. (£3
20
418s. (4s.
26d. (0d.
104f. (¼d.

18. 109) £102, 10s. 6¾d. (£0
2050s. (18s.
88
1062d. (9d.
81
327f. (¾d.

19. 231) £207, 8s. 4½d. (£0
4148s. (17s.
221
2656d. (11d.
115
462f. (½d.

20.
758) £9814 10s. 5d. (£12
718
14370s. (18s.
726
8717d. (11d.
379
1516f. (½d.

22. lb. oz. dwt. gr.
23) 490 3 5 3 (21 lb.
7
87 oz. (3 oz.
18
365 dwt. (15 dwt.
20
483 gr. (21 gr.

23.
57) 1025 yd. 1 ft. 5 in. (17 yd.
56
169 ft. (2 ft.
55
665 in. (11 in.
38
456 lin. (8 lin.

24.
61) 1062 m. 4 fu. 14 per. (17 m.
25
204 fur. (3 fur.
21
854 po. (14 po.

21.
317) £215, 12s. 6¼d. (£0
4312s. (13s.
191
2298d. (7d.
79
317f. (¼d.

25.
19) 170 qr. 3 bu. 1 pk. (8 qr.
18
147 bu. (7 bu.
14
57 pk. (3 pk.

26.
17) 249 yd. 2 qr. 3 nl. (14 yd.
11
46 qr. (2 qr.
12
51 nl. (3 nl.

27.
29) 168 ac. 0 ro. 3 per. (5 ac.
23
92 ro. (3 ro.
5
203 per. (7 per.

28.
37) 127 qr. 4 bu. 3 pk. (3 qr.
16
132 bu. (3 bu.
21
87 pk. (2$\frac{13}{37}$ pk.
13

CASE II.

ANSWERS.

	£	s.	d.		£	s.	d.		£	s.	d.
1.	14	9	$8\frac{1}{4}$	6.	11	9	$2\frac{1}{2}$	11.	0	13	8
2.	5	12	11	7.	149	17	11	12.	6	14	4
3.	159	14	8	8.	0	17	$3\frac{3}{4}$	13.	1	8	$5\frac{1}{2}\ \frac{1}{8}$
4.	14	12	7	9.	62	7	$2\frac{1}{2}$	14.	73	17	$8\frac{3}{4}$
5.	7	16	$6\frac{1}{4}\ \frac{1}{7}$	10.	21	15	$0\frac{1}{4}$	15.	0	14	11

16. 29 lb. 8 oz. 1 dwt. 18 gr.
17. 5 lb. 8 oz. 2 dr.
18. 1 lb. 11 oz. 7 dr. 1 sc. 14 g.
19. 14 yd. 2 qr. 3 nl.
20. 21 lb. 3 oz. 19 dwt. 10 g.
21. 17 yd. 2 ft. 11 in.
22. 17 yd. 2 ft. 11 in. 8 li.
23. 17 ml. 3 fu. 14 po.
24. 14 yd. 2 qr. 3 nl.
25. 9 qr. 3 bu. 2 pk.
26. 8 qr. 5 bu. 3 pk.
27. 7 cwt. 2 qr. 18 lb.
28. 15 lb. 3 oz. 5 dr.
29. 6 lb. 2 oz. 7 dr. 2 sc. 10 gr.
30. 4 ac. 2 ro. 7 per.
31. 37 tons, 15 cwt. 2 qr.
32. 15 lb. 13 oz. 3 dr.

CASE III.

1. $$24\left\{\begin{array}{l}6)\underline{\text{£}7,\ \ 6\text{s.}\ 0\text{d.}}\\ 4)\underline{\ \ 1\quad 4\quad 4\ \ }\end{array}\right.$$
$$\text{£}0,\ \ 6\text{s.}\ 1\text{d.}$$

2. $$36\left\{\begin{array}{l}6)\underline{\text{£}64,\ 19\text{s.}\ 0\text{d.}}\\ 6)\underline{\ \ 10\quad 16\quad 6\ \ }\end{array}\right.$$
$$\text{£}1,\ 16\text{s.}\ 1\text{d.}$$

3. $$48\left\{\begin{array}{l}8)\underline{\text{£}37,\ 14\text{s.}\ 8\text{d.}}\\ 6)\underline{\ \ 4\quad 14\quad 4\ \ }\end{array}\right.$$
$$\text{£}0,\ 15\text{s.}\ 8\tfrac{1}{2}\text{d.}\ \tfrac{3}{8}$$

4. $$42\left\{\begin{array}{l}6)\underline{\text{£}380,\ \ 9\text{s.}\ 0\text{d.}}\\ 7)\underline{\ \ 63\quad 8\quad 2\ \ }\end{array}\right.$$
$$\text{£}9,\ \ 1\text{s.}\ 2\text{d.}$$

5. $$16\left\{\begin{array}{l}4)\underline{\text{£}78,\ 16\text{s.}\ 8\text{d.}}\\ 4)\underline{\ \ 19\quad 14\quad 2\ \ }\end{array}\right.$$
$$\text{£}4,\ 18\text{s.}\ 6\tfrac{1}{2}\text{d.}$$

6. $$55\left\{\begin{array}{l}5)\underline{\text{£}9134,\ \ 1\text{s.}\ 8\text{d.}}\\ 11)\underline{\ \ 1826\quad 16\quad 4\ \ }\end{array}\right.$$
$$\text{£}166,\ \ 1\text{s.}\ 5\tfrac{3}{4}\text{d.}\ \tfrac{8}{11}$$

7. $$63\left\{\begin{array}{l}7)\underline{\text{£}529,\ \ 4\text{s.}\ 0\text{d.}}\\ 9)\underline{\ \ 75\quad 12\quad 0\ \ }\end{array}\right.$$
$$\text{£}8,\ \ 8\text{s.}\ 0\text{d.}$$

8. $$72\left\{\begin{array}{l}8)\underline{\text{£}56,\ 14\text{s.}\ 0\text{d.}}\\ 9)\underline{\ \ 7\quad 1\quad 9\ \ }\end{array}\right.$$
$$\text{£}0,\ 15\text{s.}\ 9\text{d.}$$

9. $$90\left\{\begin{array}{l}9)\underline{\text{£}22,\ \ 6\text{s.}\ \ 3\text{d.}}\\ 10)\underline{\ \ 2\quad 9\quad 7\ \ }\end{array}\right.$$
$$\text{£}0,\ \ 4\text{s.}\ 11\tfrac{1}{2}\text{d.}$$

10. $$30\left\{\begin{array}{l}3)\underline{\text{£}37,\ \ 5\text{s.}\ \ 7\tfrac{1}{2}\text{d.}}\\ 10)\underline{\ \ 12\quad 8\quad 6\tfrac{1}{2}\ \ }\end{array}\right.$$
$$\text{£}1,\ \ 4\text{s.}\ 10\tfrac{1}{4}\text{d.}$$

11. 45 { 5)£4, 4s. 4½d.
9) 0 16 10½
£0, 1s. 10½d.

12. 56 { 7)£22, 1s. 0d.
8) 3 3 0
£0, 7s. 10½d.

13. 50 { 5)£135, 0s. 0d.
10) 27 0 0
£2, 14s. 0d.

14. 36 { 6)£38, 8s. 0d.
6) 6 8 0
£1, 1s. 4d.

15. 64 { 8)£198, 8s. 0d.
8) 24 16 0
£3, 2s. 0d.

16. 72 { 8)£113, 8s. 0d.
9) 14 3 6
£1, 11s. 6d.

17. 21 { 3)£37, 16s. 0d.
7) 12 12 0
£1, 16s. 0d.

18. 99 { 9)£93, 16s. 10½d.
11) 10 8 6½
£0, 18s. 11½d.

19. 84 { 7)£75, 12s. 0d.
12) 10 16 0
£0, 18s. 0d.

20. 120 { 10)£45, 0s. 0d.
12) 4 10 0
£0, 7s. 6d.

21. 96 { 8)£9, 2s. 0d.
12) 1 2 9
£0, 1s. 10¾d.

22. 132 { 11)£36, 6s. 0d.
12) 3 6 0
£0, 5s. 6d.

23. 336 { 6)£81, 4s. 0d.
7) 13 10 8
8) 1 18 8
£0, 4s. 10d.

24. 112 { 4)£21, 4s. 8d.
4) 5 6 2
7) 1 6 6½
£0, 3s. 9½d.

25. qr. bu. pk.
14 { 7)104 2 3
2) 14 7 1
7 3 2½

26. lb. oz. dwt. gr.
21 { 3)447 7 13 9
7)149 2 11 3
21 3 15 21

27. yd. ft. in.
54 { 6)971 1 6
9)161 2 9
17 2 11⅔

28. ml. fu. po.
56 { 7)975 3 24
8)139 2 32
17 3 14

29. ac. ro. per.
28 { 4)162 0 36
7) 40 2 9
5 3 7

CASE IV.

1.
£7, 0s. 0¾d.)£301, 2s. 8¼d.
140s. 6022s.
1680d. 72272d.
6723f.)289089f.
43 times

2.
£13, 11s. 5½d.)£570, 1s. 3d.
271s. 11401s.
3257d. 136815d.
13030f.)547260f.
42 times

3.
17s. 11¾d.) £50, 6s. 10d.
215d. 1006s.
863f. 12082d.
863)48328f.
56 times

4.
£8, 7s. 7¼d.)£905, 1s. 3d.
167s. 18101s.
2011d. 217215d.
8045f.)868860f.
108 times

5.
£6, 3s. 8¾d.)£4349, 1s. 7¼d.
123s. 86981s.
1484d. 1043779d.
5939f.)4175117f.
703 times

6.
£1, 5s. 0½d.)£8866, 0s. 0½d.
25s. 177320s.
300d. 2127840d.
1202f.)8511362f.
7081 times

7.
£27,14s.5¼d.)£2855,7s.0¾d.
554s. 57107s.
6653d. 685284d.
26613f.)2741139f.
103 times

8.
18s. 7¼d.)£4539, 8s. 4d.
223d. 90788s.
893f. 1089460d.
893)4357840f.
4880 times

9.
19s. 1d.)£348, 5s. 5d.
229d. 6965s.
229)83585d.
365 times

10.
£7, 13s. 7½d.)£2673, 1s. 6d.
153s. 53461s.
1843d. 641538d.
7374f.)2566152f.
348 times

---

1. 1 yard = 7s. 8¾d.

2. 1 piece = £4, 5s. 0½d.
1 yard = £0, 7s. 8¾d.

3. 47) 690s. 3¾d. (14s.
32
387 d. (8d.
11
47 qr. (¼d.

4. 57) 1104s. 4½d. (19s.
21
256 d. (4d.
28
114 f. (½d.

cwt. qr. lb.
5. 7 2 18 per hhd.

6. £123, 6s. 8d. each

7. £125, 9s. loss of each

8. (3 × 5) + 6 = 21
$21\begin{cases} 3)\text{£}3,\ 10s.\ 0d. \\ 7)\ 1\ \ 3\ \ 4 \end{cases}$
A woman, £0, 3s. 4d.
A man, £0, 10s. 0d.

9. 37) 473s. 3½d. (12s.
29
351 d. (9d.
18
74 qr. (½d.

10. 6)£33, 16s. 6d.
£5, 12s. 9d. for 8 yd.

cwt. qr. lb.
11. 7) 23 3 21
3 1 19 per cask

bu. ga. qt.
12. 4) 28 3 2
7 0 3½ in 7 cas.

13. 1,00d.)45,00d.
45 yds. in a piece

14. 175s. d.)6475s. d.
4 4
7,00) 259,00
37 oz.

15. £5, 13s. 4d.
3
17 poor persons

16. d. d.
2085)1351080(648 patients
10008
16680

17. 353 cwt.
2
706 feet of wood

18. 9½d.) 560½d.
19) 1121 (59 wks.
171

19. 52)885d.($17\frac{1}{52}$d. weekly
365
1

SUPPLEMENT TO COMPOUND MULTIPLICATION AND DIVISION.

1. 2) £7, 3s. 5d.
4½
28 13 8
3 11 8½
£32, 5s. 4½d.

2. 4) £5, 14s. 7d.
3¼
17 3 9
1 8 7¾
£18, 12s. 4¾d.

3. £40, 7s. $6\frac{1}{2}$d.
$7\frac{3}{4}$
4) 121 2 $7\frac{1}{4}$
30 5 $7\frac{3}{4}$ $\frac{1}{4}$
282 12 $9\frac{1}{2}$
£312, 18s. $5\frac{1}{4}$d. $\frac{1}{4}$

4. £36, 10s. $7\frac{1}{4}$d.
$11\frac{3}{8}$
8) 109 11 $9\frac{3}{4}$
13 13 $11\frac{1}{2}$ $\frac{7}{8}$
401 16 $7\frac{3}{4}$
£415, 10s. $7\frac{1}{4}$d. $\frac{7}{8}$

5. 9) £49, 18s. 8d.
$24\frac{1}{9}$
1198 8 0
5 10 $11\frac{1}{2}$ $\frac{2}{9}$
£1203, 18s. $11\frac{1}{2}$d. $\frac{2}{9}$

6. £56, 10s. $10\frac{1}{2}$d.
$38\frac{2}{5}$
5) 113 1 9
22 12 $4\frac{1}{5}$
2148 13 3
£2171, 5s. $7\frac{1}{5}$d.

7. 3) cwt. 6 qr. 3 lb. 17
$5\frac{1}{3}$
34 2 1
2 1 $5\frac{2}{3}$
36 3 $6\frac{2}{3}$

8. 5) qr. 8 bu. 4 pk. 1 ga. 1 qt. 1
$7\frac{1}{5}$
59 6 3 0 3
1 5 2 1 $1\frac{4}{5}$
61 4 2 0 $0\frac{4}{5}$

9. $4\frac{1}{3}$) £43, 17s. $5\frac{3}{4}$d.
3 3
13) 131 12 $5\frac{1}{4}$
£10, 2s. $5\frac{3}{4}$d. $\frac{10}{13}$

10.
$9\frac{3}{5}$) £86, 18s. $10\frac{1}{2}$d.
5 5
48 { 4) 434 14 $4\frac{1}{2}$
{ 12) 108 13 $7\frac{0}{4}$ –2 }
£9 1s. $1\frac{1}{2}$d.–4 } $\frac{3}{8}$

11. $8\frac{1}{2}$) £74, 10s. $7\frac{3}{4}$d.
2 2
17) 149 1 $3\frac{1}{2}$
£8, 15s. $4\frac{1}{4}$d. $\frac{13}{17}$

12. $11\frac{3}{4}$) £89, 18s. $8\frac{1}{2}$d.
4 4
47) 359 14 10
£7, 13s. $0\frac{3}{4}$d. $\frac{43}{47}$

13.
$25\frac{3}{7}$) £486, 17s. $10\frac{3}{4}$d.
7 7
178) 3408 5 $3\frac{1}{4}$
£19, 2s. $11\frac{1}{4}$d. $\frac{115}{178}$

14.
$46\frac{2}{3}$) £589, 19s. $11\frac{3}{4}$d.
3 3
140) 1769 19 $11\frac{1}{4}$
£12, 12s. $10\frac{1}{4}$d. $\frac{17}{140}$

15. $6\frac{4}{7}$) cwt. 23 qr. 3 lb. 18
7 7
46) 167 1 14
3 2 $15\frac{12}{23}$

16. $14\frac{7}{13}$) ac. 84 ro. 2 per. 34
13 13
189) 1101 1 2
5 3 $12\frac{2}{7}$

QUESTIONS ON THE PRECEDING RULES.

1. 7 yd.=£4, 14s. 6d.
$\frac{1}{4}$ 〃 = 0 3 4$\frac{1}{2}$
7$\frac{1}{4}$ 〃 =£4, 17s. 10$\frac{1}{2}$d.

2. 9 gal.=£8, 16s. 7$\frac{1}{2}$d.
$\frac{2}{8}$ 〃 = 0 4 10$\frac{3}{4}$ $\frac{2}{4}$
$\frac{1}{8}$ 〃 = 0 2 5$\frac{1}{4}$ $\frac{3}{4}$
9$\frac{3}{8}$ 〃 =£9, 3s. 11$\frac{3}{4}$d. $\frac{1}{4}$

cwt. qr. lb.
3. 4 hhd.=19 1 16
—$\frac{1}{4}$ 〃 = 1 0 23$\frac{3}{4}$
3$\frac{3}{4}$ 〃 =18 0 20$\frac{1}{4}$

4. 13$\frac{3}{4}$) £8, 17s. 7$\frac{1}{2}$d.
4 4
55 { 5) 35 10 5
{ 11) 7 2 1
£0, 12s. 11d.

5. 11$\frac{5}{6}$) £46, 16s. 6d.
6 6
71) 280 19 0
Each cwt. £3 19s. 1$\frac{1}{2}$d. $\frac{54}{71}$

6. 5$\frac{1}{2}$) £394, 11s. 7d.
2 2
11) 789 3 2
A man, £71, 14s. 10d.
A boy, £35, 17s. 5d.

7. 2) 678 poles
5$\frac{1}{2}$
3390
339
3729 yards

8. 365$\frac{1}{4}$) 75642 days
4 4
1461) 302568
207$\frac{141}{1461}$ yrs.

9. 29$\frac{1}{2}$) 9874
2 2
59) 19748
334 moons
[21 days

10. 758 links
8
100) 6064
60$\frac{16}{25}$
45 { 9) 6003$\frac{9}{25}$ in.
{ 5) 667$\frac{1}{25}$ qr.
133 En.ells 2$\frac{1}{25}$qr.

11. 857 Sc. ells.
3$\frac{1}{12}$ ft. in 1 Sc. ell
71 ft. 5 in.
2571 0
2642 ft. 5 in.

12. 3$\frac{1}{12}$) 740 ft.
12 12
37) 8880
240 Sc. ells

13\.
349h.d.)8575h.d.(24$\frac{199}{349}$ yd.
1595
199

14. £960, 0s. 0d.
150 0 0
365)810 0 0
£2, 4s. $4\frac{1}{2}$d. $\frac{30}{73}$

15. Earns, 15s. 6d.
Saves, 180s.÷52=3 $5\frac{1}{2}$ $\frac{2}{13}$
Spends, 12s. $0\frac{1}{4}$d. $\frac{11}{13}$

16.
A florin = 2s. 0d.
A crown = 5 0
A half-gu. = 10 6
A half-cr. = 2 6
In 1 purse, £1 0s. 0d.
In 48 purses, £48, 0s. 0d.

17. 10602 dol.
17
80)180234 th. d.
£2252, 18s. 6d.

18. 5170 pistoles
5
6)25850
4308 gu. 7s.

19. 74867 cr.
10
9)748670 s. d.
83185 dol. 2s. 6d.

20. 36)678495 Sc. ells. 0 in.
18847 3 in.
697342 yards, 3 in.

21. $9\frac{3}{4}$d.) £2717
4 960
39 f.) 2608320
66880 francs

22. £1312, 3s. 9d.
20
4s. 3d.)26243s.
4 4
17 th. d.)104975 th. d.
6175 dollars

23. £1939, 11s. 8d.
10
19395 fl. 1s. 8d.

24. 54 pie. = £194, 8s. 0d.
48 〃 = 86 8 0
234 〃 = 193 1 0
196 〃 = 264 12 0
215 〃 = 51 1 3
464 〃 = 23200 0 0
In all, = £23989, 10s. 3d.

	lb.	oz.	dwt.
25. Dishes,	51	6	0
Plates,	31	7	2
In all,	83	1	2

26. 112 lb.
$11\frac{1}{2}$
1232
1288 lb.)141680 lb.
110 hhd.

27. 25 cwt. 2 qrs. 24 lb.
12) 2880 lb.
240 canisters.

28. 37) 1463645556 yards
—39557988
1424087568 Sc. el.

29. 360°
69$\frac{1}{2}$ = 70−$\frac{1}{2}$
25200
—180
25020 miles.
63360 in. in 1 ml.
1585267200 inches

ml. fu. po.
30. 6817 2 7
8
54538 fur.
40
2181527 po.
200—2=198 in.
436305400
—4363054
431942346 in.

31. 126 gal. = 1 pipe
84 = 1 pun.
63 = 1 hhd.
42 = 1 tierce
315) 20790
66 of each

qr. bu. pk.
32. 3 5 2
9
33 1 2
7
232 2 2

33. 365
35
1825
1095
249
148) 13024
88 days

34. 5280 feet
390
475200
1584
15 ft.) 2059200 ft.
137280 times

35. 38
36
1368 let. in 1 page
421
575928 let. in 1 vol.
12
6911136 let. in 12 vols.

cwt. qr. lb.
36. 6 1 12 gross
0 1 14 tare
5 3 26 net in 1 h.
11
65 3 6 net in all.

37. 8 children's shares
18 〃 for 6 women
24 〃 for 4 men
50)£26, 3s. 11$\frac{1}{2}$d.
£0, 10s. 5$\frac{3}{4}$d. a child
£1, 11s. 5$\frac{1}{4}$d. woman
£3, 2s. 10$\frac{1}{2}$d. a man

38. 25s. 6d.
15 6
4 6 £170, 12s. 6d.
45 6 3412s.
546d.) 40950d.
75 of each

cwt. qr. lb.
39. 6) 8 1 18
1 1 17 each

40.

	lb.	oz.	dwt.
Tablespoons,	5	4	16
Teaspoons,	2	2	2
Mugs,	4	7	8
Tankards,	3	11	6
Whole weight,	16	1	12

41.

		cwt.	qr.	lb.	
15	3)	52	0	26	
	5)	17	1	18	
		3	1	26	each

42.

cwt.	qr.	lb.	
3	2	17	gross of 1 hhd.
0	0	18	tare.
3	1	27	net of 1 hhd.
		7	
24	1	21	net of 7 hhd.

43.

cwt.	qr.	lb.	
3	0	24	gross of 1 hhd.
0	0	16	tare.
3	0	8	net of 1 hhd.
		7	
21	2	0	
		8	
172	0	0	net of 56 hhd.

44.

cwt.	qr.	lb.	oz.	dr.	
8	3	0	0	0	gr.
0	0	18	2	12	tare
8	2	9	13	4	net
				4	
34	1	11	5	0	
				9	
309	0	17	13	0	net

45.

cwt.	qr.	lb.	oz.	
6	2	14	0	gross
0	0	3	4	tare
6	2	10	12	net
			5	
32	3	25	12	net

46.

		£	s.	d.
B. P. =		£89,	6s.	5½d.
Gain, =		1	11	3
	5)	90	17	8½
25	5)	18	3	6½
	5)	3	12	8½
S. P. per yd.		£0,	14s.	6½d.

47.

		£	s.	d.
B. P. =		£64,	18s.	0d.
Loss, =		1	13	0
	2)	63	5	0
288	12)	31	12	6
	12)	2	12	8½
S. P. per yd.		£0,	4s.	4½d. ⅚

48.

	£	s.	d.
133y. at 6s. 8d. =	£44,	6s.	8d.
56 〃 5s. 3½d. =	14	16	4
S. P. of 189 yd. =	59	3	0
B. P. of 189 〃 =	55	12	0
Whole gain =	£3,	11s.	0d.

49.

£	s.	d.	
£0,	12s.	6d.	wkly gain
0	9	11¾	expenses
0	2	6¼	saves wkly.
		52	
£6,	11s.	1d.	yearly

50. 21d.—13$\frac{1}{2}$d.=7$\frac{1}{2}$d.
£1, 10s. 5d.=365d.
7$\frac{1}{2}$
£10 12 11
0 15 2$\frac{1}{2}$
Lays up, £11, 8s. 1$\frac{1}{2}$d.

51. 365s. = £18, 5s. 0d.
4$\frac{1}{2}$
73 0 0
9 2 6
Yearly inc., 82 2 6
Expenses, 71 1 6
Lays up, £11, 1s. 0d.

52) £71, 1s. 6d.
Wkly exp., £1, 7s. 4$\frac{1}{26}$d.

52. £114, 18s. 6d.
5
Cleared, £574, 12s. 6d.

53. 4) £348, 15s. 0d.
£87, 3s. 9d. each

54.
7 sh. = £5492, 14s. 6d.
77 〃 = 60419 19 6
—1 〃 = 784 13 6
76 〃 = £59635, 6s. 0d.

THE GREATEST COMMON MEASURE.

1.

304(9	336(1
288	304
16	32(2
	32

G. C. M. 16

2.

165(5	195(1
150	165
15	30(2
	30

G. C. M. 15

3.

357(5	425(1
340	357
17	68(4
	68

G. C. M. 17

4.

2431(8	2717(1
2288	2431
143	286(2
	286

G. C. M. 143

5.

2160(1	4032(1
288(2	1872(6
	144

G. C. M. 144

6.

4524(4	5460(1
780(5	936(1
	156

G. C. M. 156

7.

8977(2	13179(1
573(3	4202(7
	191

G. C. M. 191

8. 11760(2 16170(1
2940(2 4410(1
1470

G. C. M. 1470

9. 34986(1 60025(1
9947(1 25039(2
4802(14 5145(1
343

G. C. M. 343

THE LEAST COMMON MULTIPLE.

1. 7 may be omitted, as it is contained in 14,

$$\begin{array}{r|l} 2 & 14, 18, 24 \\ 4 & 7, 9, 12 \\ 3 & 7, 9, 3 \\ 3 & 7, 3, 1 \\ 7 & 7, 1, 1 \\ & 1, 1, 1 \end{array}$$

L. C. M. 2×4×9×7 = 504

2. Omitting 2 and 9, which are contained in 12 and 27 respectively,

$$\begin{array}{r|l} 4 & 12, 15, 27 \\ 3 & 3, 15, 27 \\ 5 & 1, 5, 9 \\ 9 & 1, 1, 9 \\ & 1, 1, 1 \end{array}$$

L. C. M. 4×3×5×9 = 540

3. Omitting 8 and 14,

$$\begin{array}{r|l} 2 & 6, 28, 32 \\ 2 & 3, 14, 16 \\ & 3, 7, 8 \end{array}$$

L. C. M. 4×3×7×8 = 672

4. Omitting 6 and 15,

$$\begin{array}{r|l} 2 & 18, 24, 30 \\ 3 & 9, 12, 15 \\ & 3, 4, 5 \end{array}$$

L. C. M. 6×3×4×5 = 360

5. Omitting 13 and 52,

$$\begin{array}{r|l} 4 & 32, 44, 65, 48 \\ 4 & 8, 11, 65, 12 \\ & 2, 11, 65, 3 \end{array}$$

L. C. M. 16×22×195=68640

6. Omitting 12, 14, and 16,

$$\begin{array}{r|l} 3 & 35, 48, 63 \\ 7 & 35, 16, 21 \\ & 5, 16, 3 \end{array}$$

L. C. M. 21×5×48 = 5040

7. Omitting 143 and 51,

$$\begin{array}{r|l} 11 & 187, 156, 429 \\ 13 & 17, 156, 39 \\ 3 & 17, 12, 3 \\ & 17, 4, 1 \end{array}$$

L. C. M. 11×39×68=29172

8. Omitting 76 and 38,

$$\begin{array}{r|l} 4 & 152, 448, 748 \\ 2 & 38, 112, 187 \\ & 19, 56, 187 \end{array}$$

L. C. M. 8×19×56×187=
[1591744

VULGAR FRACTIONS.

REDUCTION OF VULGAR FRACTIONS.

PROBLEM I. ANSWERS.

$4\frac{3}{8}$; $6\frac{1}{3}$; $14\frac{1}{4}$; $15\frac{3}{7}$; $12\frac{5}{8}$; $7\frac{1}{2}$; $11\frac{1}{7}$; $13\frac{2}{5}$; $12\frac{13}{19}$; $15\frac{1}{25}$; $366\frac{10}{13}$.

PROBLEM II. ANSWERS.

$\frac{35}{8}$; $\frac{19}{3}$; $\frac{57}{4}$; $\frac{108}{7}$; $\frac{101}{8}$; $\frac{15}{2}$; $\frac{78}{7}$; $\frac{67}{5}$; $\frac{241}{19}$; $\frac{376}{25}$; $\frac{4768}{13}$.

PROBLEM III.

$\frac{3}{8}$ of $\frac{4}{15} = \frac{1}{2}$ of $\frac{1}{5} = \frac{1}{10}$ | $\frac{4}{7}$ of $\frac{5}{12}$ of $\frac{6}{1} = \frac{2}{7}$ of $\frac{5}{1} = \frac{10}{7} = 1\frac{3}{7}$
$\frac{3}{7}$ of $\frac{5}{8}$ of $\frac{1}{6} = \frac{1}{7}$ of $\frac{5}{8}$ of $\frac{1}{2} = \frac{5}{112}$ | $\frac{3}{5}$ of $\frac{12}{19} = \frac{36}{95}$

$\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{7}$ of $\frac{28}{3} = \frac{2}{1}$ of $\frac{4}{3} = \frac{8}{3} = 2\frac{2}{3}$
$\frac{6}{11}$ of $\frac{5}{8} = \frac{3}{11}$ of $\frac{5}{4} = \frac{15}{44}$
$\frac{7}{11}$ of $\frac{55}{8}$ of $\frac{16}{5} = \frac{7}{1}$ of $\frac{2}{1} = 14$
$\frac{4}{11}$ of $\frac{44}{7}$ of $\frac{14}{1} = \frac{4}{1}$ of $\frac{4}{1}$ of $\frac{2}{1} = 32$

PROBLEM IV.

$\frac{176}{484} = \frac{4}{11}$;	G. C. M. 44	$\frac{768}{1024} = \frac{3}{4}$;	G.C.M. 256
$\frac{48}{160} = \frac{3}{10}$;	" 16	$\frac{3360}{4032} = \frac{5}{6}$;	" 672
$\frac{7845}{96780} = \frac{523}{6452}$;	" 15	$\frac{404}{1111} = \frac{4}{11}$;	" 101
$\frac{8664}{8986} = \frac{4332}{4493}$;	" 2	$\frac{1022}{1241} = \frac{14}{17}$;	" 73
$\frac{740}{8675} = \frac{148}{1735}$;	" 5	$\frac{4485}{1035} = \frac{13}{3} = 4\frac{1}{3}$;	" 345
$\frac{764}{5240} = \frac{191}{1310}$;	" 4	$\frac{1936}{847} = \frac{16}{7} = 2\frac{2}{7}$;	" 121
$\frac{644}{1728} = \frac{161}{432}$;	" 4	$\frac{73205}{19965} = \frac{11}{3} = 3\frac{2}{3}$;	" 6655

$\frac{76923}{999999} = \frac{1}{13}$; G. C. M., 76923.

PROBLEM V.

1. $\frac{7}{8}, \frac{5}{6} = \frac{21}{24}, \frac{20}{24}$ | 2. $\frac{1}{2}, \frac{1}{3}, \frac{3}{4} = \frac{6}{12}, \frac{4}{12}, \frac{9}{12}$
3. $\frac{5}{6}, \frac{7}{8}, \frac{8}{9}, \frac{9}{10} = \frac{300}{360}, \frac{315}{360}, \frac{320}{360}, \frac{324}{360}$
4. $\frac{3}{4}, \frac{5}{8}, \frac{7}{12}, \frac{1}{6} = \frac{18}{24}, \frac{15}{24}, \frac{14}{24}, \frac{4}{24}$
5. $\frac{2}{7}, \frac{9}{14}, \frac{17}{21}, \frac{5}{42} = \frac{12}{42}, \frac{27}{42}, \frac{34}{42}, \frac{5}{42}$
6. $\frac{5}{6}, \frac{7}{12}, \frac{5}{18}, \frac{7}{36} = \frac{30}{36}, \frac{21}{36}, \frac{10}{36}, \frac{7}{36}$
7. $\frac{2}{3}, \frac{3}{4}, \frac{5}{6}, \frac{4}{9}, \frac{15}{16} = \frac{96}{144}, \frac{108}{144}, \frac{120}{144}, \frac{64}{144}, \frac{135}{144}$
8. $\frac{7}{11}, \frac{8}{9}, \frac{6}{13} = \frac{819}{1287}, \frac{1144}{1287}, \frac{594}{1287}$
9. $\frac{4}{15}, \frac{11}{12}, \frac{3}{13}, \frac{1}{11} = \frac{2288}{8580}, \frac{7865}{8580}, \frac{1980}{8580}, \frac{780}{8580}$

10. $\frac{8}{9}, \frac{3}{11}, \frac{7}{18}, \frac{9}{22} = \frac{176}{198}, \frac{54}{198}, \frac{77}{198}, \frac{81}{198}$
11. $\frac{4}{5}, \frac{3}{7}, \frac{13}{15}, \frac{16}{17} = \frac{1428}{1785}, \frac{765}{1785}, \frac{1547}{1785}, \frac{1680}{1785}$
12. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{3}{4}, \frac{5}{7} = \frac{42}{84}, \frac{28}{84}, \frac{21}{84}, \frac{63}{84}, \frac{60}{84}$
13. $\frac{3}{8}, \frac{5}{9}, \frac{3}{20} = \frac{135}{360}, \frac{200}{360}, \frac{54}{360}$
14. $\frac{43}{15}, \frac{97}{56}, \frac{27}{38} = \frac{45752}{15960}, \frac{27645}{15960}, \frac{11340}{15960}$

PROBLEM VI.

1. $\frac{4}{9}$ of £$\frac{1}{9360}$ = £$\frac{1}{21060}$
2. $\frac{4}{5}$ of $\frac{1}{21}$ gu. = $\frac{4}{105}$ gu.
3. $\frac{9}{11}$ of $\frac{1}{2}$ fl. = $\frac{9}{22}$ fl.
4. $\frac{5}{12}$ of £$\frac{1}{4}$ = £$\frac{5}{48}$
5. $\frac{4}{7}$ of $\frac{1}{48}$s. = $\frac{1}{84}$s.
6. $\frac{2}{3}$ of £$\frac{1}{8}$ = £$\frac{1}{12}$
7. $\frac{7}{8}$ of $\frac{1}{252}$ gu. = $\frac{1}{288}$ gu.
8. $\frac{5}{7}$ of $\frac{1}{2240}$ to. = $\frac{1}{3136}$ to.
9. $\frac{8}{9}$ of $\frac{1}{1792}$ ct. = $\frac{1}{2016}$ cwt.
10. $\frac{4}{5}$ of $\frac{1}{256}$ lb. = $\frac{1}{320}$ lb.
11. $\frac{9}{11}$ of $\frac{1}{1760}$ ml. = $\frac{9}{19360}$ ml.
12. $\frac{12}{13}$ of $\frac{1}{3600}$ sec. = $\frac{1}{3900}$ ho.

1. $\frac{1}{21060}$ of $\frac{9360}{1}$ f. = $\frac{4}{9}$ f.
2. $\frac{4}{105}$ of $\frac{21}{1}$ s. = $\frac{4}{5}$ s.
3. $\frac{9}{22}$ of $\frac{2}{1}$ s. = $\frac{9}{11}$ s.
4. $\frac{5}{48}$ of $\frac{4}{1}$ cr. = $\frac{5}{12}$ cr.
5. $\frac{1}{84}$ of $\frac{48}{1}$ f. = $\frac{4}{7}$ f.
6. $\frac{1}{12}$ of $\frac{8}{1}$ h. c. = $\frac{2}{3}$ h.c.
7. $\frac{1}{288}$ of $\frac{252}{1}$ d. = $\frac{7}{8}$ d.
8. $\frac{1}{3136}$ of $\frac{2240}{1}$ lb. = $\frac{5}{7}$ lb.
9. $\frac{1}{2016}$ of $\frac{1792}{1}$ oz. = $\frac{8}{9}$ oz.
10. $\frac{1}{320}$ of $\frac{256}{1}$ dr. = $\frac{4}{5}$ dr.
11. $\frac{9}{19360}$ of $\frac{1760}{1}$ yd. = $\frac{9}{11}$ yd.
12. $\frac{1}{3900}$ of $\frac{3600}{1}$ sec. = $\frac{12}{13}$ sec.

1. $\frac{4}{5}$ of $\frac{20}{21}$ gu. = $\frac{16}{21}$ gu.
2. $\frac{7}{8}$ of $\frac{5}{2}$ fl. = $\frac{35}{16}$ fl.
3. $\frac{3}{4}$ of $\frac{5}{21}$ gu. = $\frac{5}{28}$ gu.
4. $\frac{3}{5}$ of $\frac{4}{5}$ E. ell = $\frac{12}{25}$ E. ell.
5. $\frac{2}{3}$ of $\frac{3}{5}$ E. ell = $\frac{2}{5}$ E. ell.
6. $\frac{4}{9}$ of $\frac{5}{21}$ gu. = $\frac{20}{189}$ gu.

1. $\frac{16}{21}$ of £$\frac{21}{20}$ = £$\frac{4}{5}$
2. $\frac{35}{16}$ of $\frac{2}{5}$ cr. = $\frac{7}{8}$ cr.
3. $\frac{5}{28}$ of $\frac{21}{5}$ cr. = $\frac{3}{4}$ cr.
4. $\frac{12}{25}$ of $\frac{5}{4}$ yd. = $\frac{3}{5}$ yd.
5. $\frac{2}{5}$ of $\frac{5}{3}$ Fl. ell. = $\frac{2}{3}$ F.ell.
6. $\frac{20}{189}$ of $\frac{21}{5}$ cr. = $\frac{4}{9}$ cr.

1. 7d. = £$\frac{7}{240}$
2. 18 f. = $\frac{18}{48}$ s. = $\frac{3}{8}$ s.
3. 39 f. = $\frac{39}{1008}$ gu. = $\frac{13}{336}$ gu.
4. 236 d. = £$\frac{236}{240}$ = £$\frac{59}{60}$
5. 390 f. = £$\frac{370}{960}$ = £$\frac{37}{960}$
6. 1027 dr: = $\frac{1027}{28672}$ cwt.
7. $\frac{31}{4}$ dr. = $\frac{31}{1024}$ lb. av.
8. $\frac{5233}{5}$ gr. tr. = $\frac{5233}{14400}$ lb tr.
9. $\frac{296}{5}$ pt. = $\frac{296}{2560}$ qr. = $\frac{37}{320}$ qr.
10. 7397 min. = $\frac{7397}{525600}$ ye.
11. $\frac{86}{5}$ ft. = $\frac{86}{26400}$ ml. = $\frac{43}{13200}$ ml.
12. 125 per. = $\frac{125}{160}$ ac. = $\frac{25}{32}$ ac.
13. 284 pol. = $\frac{284}{320}$ ml. = $\frac{71}{80}$ ml.
14. 35 far. = $\frac{35}{240}$ cr. = $\frac{7}{48}$ cr.
15. 330 far. = $\frac{330}{504}$ h. g. = $\frac{55}{84}$ h. g.
16. 212 oz. = $\frac{212}{35840}$ to. = $\frac{53}{8960}$ ton

17. 181 gr. = $\frac{181}{480}$ oz. tr.
18. 71 pt. = $\frac{71}{512}$ qr.
19. 141 pt. = $\frac{141}{512}$ qr.
20. 15 pk. = $\frac{15}{32}$ qr.
21. 2407 gr. = $\frac{2407}{5760}$ oz. tr.
22. 97 per. = $\frac{97}{160}$ ac.
23. 24 sec. = $\frac{24}{3600}$ ho. = $\frac{1}{150}$ ho.
24. 915 min. = $\frac{915}{1440}$ da. = $\frac{61}{96}$ da.

25. 930d. = $\frac{930}{3255}$ or $\frac{2}{7}$ of £13, 11s. 3d.
26. 329 lb. = $\frac{329}{420}$ or $\frac{47}{60}$ of 3 cwt. 3 qr.
27. 1035 dwt. = $\frac{1035}{1840}$ or $\frac{9}{16}$ of 7 lb. 8 oz.

Problem VII.

1. £7 ÷ 240 = 7d.
2. 3s. ÷ 8 = 4½d.
3. 13 gu. ÷ 336 = 9¾d.
4. £59 ÷ 60 = 19s. 8d.
5. £37 ÷ 96 = 7s. 8½d.
6. 1027 cwt. ÷ 28672 = 4 lb. 3 dr.
7. 31 lb. av. ÷ 1024 = 7¾dr.

8. 523 lb. tr. ÷ 14400 = 8 dwt. 17$\frac{1}{5}$ gr.
9. 37 qr. ÷ 320 = 7 ga. 3$\frac{1}{5}$ pt.
10. 7397 ye. ÷ 625600 = 123 ho. 17 m.
11. 43 ml. ÷ 13200 = 5 yd. 2$\frac{1}{5}$ ft.
12. 25 ac. ÷ 32 = 3 ro. 5 per.
13. 71 ml. ÷ 80 = 7 fu. 4 pol.
14. 35 sh. ÷ 40 = 8¾d.
15. 577½ s. ÷ 84 = 6s. 10½d.
16. 53 to. ÷ 8960 = 13 lb. 4 oz.
17. 181 oz. ÷ 480 = 7 dwt. 13 gr.
18. 71 qr. ÷ 512 = 8 gal. 7 pt.
19. 141 qr. ÷ 512 = 17 gal. 5 pt.
20. 15 qr. ÷ 32 = 3 bu. 3 pk.
21. 2407 lb. ÷ 5760 = 5 oz. 7 gr.
22. 97 ac. ÷ 160 = 2 ro. 17 per.
23. 1 ho. ÷ 150 = 24 sec.
24. 61 da. ÷ 96 = 15 ho. 15 min.

ADDITION OF VULGAR FRACTIONS.

1. $\frac{7}{8} + \frac{9}{14} + \frac{6}{7} = \frac{98 + 72 + 96}{112} = \frac{266}{112} = 2\frac{3}{8}$

2. $\frac{5}{11} + \frac{6}{11} + \frac{8}{11} = \frac{19}{11} = 1\frac{8}{11}$

3. $\frac{3}{7} + \frac{4}{9} + \frac{1}{5} + \frac{6}{35} = \frac{135 + 140 + 63 + 54}{315} = \frac{392}{315} = 1\frac{11}{45}$

4. $\frac{24}{37}+\frac{13}{23}+\frac{14}{17}=\frac{9384+8177+11914}{14467}=\frac{29475}{14467}=2\frac{541}{14467}$

5. $\frac{21}{40}+\frac{4}{11}=\frac{231+160}{440}=\frac{391}{440}$

6. $\frac{13}{24}+\frac{11}{18}+\frac{10}{21}=\frac{273+308+240}{504}=\frac{821}{504}=1\frac{317}{504}$

7. $\frac{7}{8}+\frac{14}{15}+\frac{13}{27}+\frac{5}{16}=\frac{1890+2016+1040+675}{2160}=\frac{5621}{2160}$
$=2\frac{1301}{2160}$

8. $\frac{4}{11}+\frac{12}{17}+\frac{13}{22}=\frac{136+264+221}{374}=\frac{621}{374}=1\frac{247}{374}$

9. $\frac{28}{39}+\frac{88}{171}=\frac{1596+1144}{2223}=\frac{2740}{2223}=1\frac{517}{2223}$

10. $\frac{5}{6}+\frac{3}{11}+\frac{8}{15}=\frac{275+90+176}{330}=\frac{541}{330}=1\frac{211}{330}$

11. $4\frac{1}{2}+7\frac{1}{3}+8\frac{4}{5}=19+\frac{15+10+24}{30}=19\frac{49}{30}=20\frac{19}{30}$

12. $9\frac{1}{4}+14+11\frac{1}{3}=34+\frac{3+4}{12}=34\frac{7}{12}$

13. $\frac{7}{8}+6\frac{3}{11}+14\frac{1}{3}+51\frac{3}{4}=71+\frac{231+72+88+198}{264}=$
$71\frac{589}{264}=73\frac{61}{264}$

14. $\frac{7}{8}$s. = 0s. $10\frac{1}{2}$d.
£$\frac{4}{11}$ = 7 $3\frac{1}{4}$ $\frac{1}{11}$
$\frac{3}{4}$d. = 0 $0\frac{3}{4}$
8s. $2\frac{1}{2}$d. $\frac{1}{11}$

15. $\frac{3}{4}$s. = 0s. 9d.
£$\frac{5}{8}$ = 12 6
$\frac{6}{7}$ gu. = 18 0
31s. 3d.

16. oz. dwt. gr.
$\frac{1}{4}$ lb. = 3 0 0
$\frac{1}{7}$ oz. = 0 2 $20\frac{20}{35}$
$\frac{3}{5}$ dwt. = 0 0 $14\frac{14}{35}$
3 3 $10\frac{34}{35}$

17. $\frac{3}{8}$ cr. = 1s. $10\frac{1}{2}$d.
£$\frac{5}{12}$ = 8 4
$\frac{8}{15}$ gu. = 11 $2\frac{1}{4}$ $\frac{3}{5}$
21s. $4\frac{3}{4}$d. $\frac{3}{5}$

18. $\frac{7}{12}$s. = 0s. 7d.
£$\frac{13}{14}$ = 18 $6\frac{3}{4}$ $\frac{3}{7}$
$\frac{5}{6}$ gu. = 17 6
36s. $7\frac{3}{4}$d. $\frac{3}{7}$

19. $\frac{5}{8}$ yd. = 2 qr. 2 nl.
$\frac{3}{5}$ E. e. = 3 0
$\frac{2}{3}$ Fl. e. = 2 0
7 qr. 2 nl.

20. $\frac{3}{5}$d. = 0s. $0\frac{1}{2}$d. $\frac{14}{35}$
$\frac{5}{8}$s. = 0 $7\frac{1}{2}$
£$\frac{5}{7}$ = 14 $3\frac{1}{4}$ $\frac{25}{35}$
$\frac{7}{8}$ gu. = 18 $4\frac{1}{2}$
33s. $4\frac{0}{4}$d. $\frac{4}{35}$

21. cwt. qr. lb. oz.
$\frac{1}{3}$ lb. = 0 0 0 $5\frac{5}{15}$
$\frac{3}{5}$ cwt. = 0 2 11 $3\frac{3}{15}$
$\frac{5}{8}$ to. = 12 2 0 0
13 0 11 $8\frac{8}{15}$

22.

$$\begin{array}{lllll} \frac{3}{5}\text{ qr.} = & 4\text{ bu.} & 3\text{ pk.} & 0\frac{6}{15}\text{ gal.} \\ \frac{2}{3}\text{ bu.} = & 0 & 2 & 1\frac{5}{15} \\ \frac{3}{5}\text{ pk.} = & 0 & 0 & 1\frac{3}{15} \\ \hline & 5\text{ bu.} & 2\text{ pk.} & 0\frac{14}{15}\text{ ga.} \end{array}$$

23.

$$\begin{array}{llll} \frac{3}{5}\text{ ho.} = & 0\text{ da.} & 0\text{ h.} & 36\text{ min.} \\ \frac{5}{12}\text{ da.} = & 0 & 10 & 0 \\ \frac{4}{7}\text{ wk.} = & 4 & 0 & 0 \\ \hline & 4\text{ da.} & 10\text{ h.} & 36\text{ min.} \end{array}$$

24.

$$\begin{array}{llllll} £84\frac{7}{11} = & £84, & 12s. & 8\frac{1}{2}d. & \frac{140}{154} \\ £17\frac{5}{7} = & 17 & 14 & 3\frac{1}{4} & \frac{110}{154} \\ 18\frac{5}{8}s. = & 0 & 18 & 7\frac{1}{2} & \\ 11\frac{3}{8}d. = & 0 & 0 & 11\frac{1}{4} & \frac{77}{154} \\ \hline & £103, & 6s. & 7\frac{0}{4}d. & \frac{19}{154} \end{array}$$

25.

$$\begin{array}{lllll} & \text{cwt.} & \text{qr.} & \text{lb.} & \text{oz.} \\ 4\frac{3}{7}\text{ cwt.} = & 4 & 1 & 20 & 0 \\ 18\frac{7}{8}\text{ lb.} = & 0 & 0 & 18 & 14 \\ 28\frac{13}{14}\text{ lb.} = & 0 & 1 & 0 & 14\frac{24}{28} \\ 13\frac{3}{4}\text{ oz.} = & 0 & 0 & 0 & 13\frac{21}{28} \\ \hline & 4 & 3 & 12 & 10\frac{17}{28} \end{array}$$

26.

$$\begin{array}{lllll} 54\frac{1}{2}\text{ yd.} = & 54\text{ yd.} & 2\text{ qr.} & 0\text{ nl.} \\ 16\frac{7}{8}\text{ yd.} = & 16 & 3 & 2 \\ 30\frac{1}{5}\text{ E. e.} = & 37 & 3 & 0 \\ 4\frac{2}{3}\text{ Fl. e.} = & 3 & 2 & 0 \\ \hline & 112\text{ yd.} & 2\text{ qr.} & 2\text{ nl.} \end{array}$$

27. In 1 day, A does $\frac{1}{4}$ of the work, B $\frac{1}{5}$, C $\frac{1}{6}$, and D $\frac{1}{8}$; hence, $\frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{8} = \frac{30+24+20+15}{120} = \frac{89}{120}$, the part done by the four in one day.

SUBTRACTION OF VULGAR FRACTIONS.

1. $\frac{4}{5} - \frac{5}{12} = \frac{48-25}{60} = \frac{23}{60}$

2. $\frac{13}{18} - \frac{5}{16} = \frac{104-45}{144} = \frac{59}{144}$

3. $\frac{8}{11} - \frac{3}{34} = \frac{272-33}{374} = \frac{239}{374}$

4. $\frac{24}{25} - \frac{15}{49} = \frac{1176-375}{1225} = \frac{801}{1225}$

5. $\frac{11}{54} - \frac{5}{56} = \frac{308-135}{1512} = \frac{173}{1512}$

6. $\frac{9}{11} - \frac{4}{13} = \frac{117-44}{143} = \frac{73}{143}$

7. $\frac{49}{8} - \frac{19}{4} = \frac{49-38}{8} = \frac{11}{8} = 1\frac{3}{8}$

8. $\frac{89}{12} - \frac{7}{2} = \frac{89-42}{12} = \frac{47}{12} = 3\frac{11}{12}$

9. $\frac{17}{2} - \frac{17}{4} = \frac{34-17}{4} = \frac{17}{4} = 4\frac{1}{4}$

10. $15 - \frac{3}{7} = 14\frac{7}{7} - \frac{3}{7} = 14\frac{4}{7}$

11. $18 - 5\frac{3}{8} = 17\frac{8}{8} - 5\frac{3}{8} = 12\frac{5}{8}$

12. $\frac{111}{8} - \frac{32}{7} = \frac{777-256}{56} = \frac{521}{56} = 9\frac{17}{56}$

13. £$\frac{7}{11}$ = 12s. $8\frac{1}{2}$d. $\frac{10}{11}$
$\frac{7}{12}$s. = 0 7
12s. $1\frac{1}{2}$d. $\frac{10}{11}$

14. £$\frac{13}{15}$ = 17s. 4d.
$\frac{4}{7}$ cr. = 2 $10\frac{1}{4}$ $\frac{1}{7}$
14s. $5\frac{1}{2}$d. $\frac{6}{7}$

15. £$\frac{8}{9}$ = 17s. $9\frac{1}{4}$d. $\frac{11}{33}$
$\frac{7}{11}$ gu. = 13 $4\frac{1}{4}$ $\frac{15}{33}$
4s. $4\frac{3}{4}$d. $\frac{29}{33}$

16. £$\frac{3}{4}$ = 15s.
$\frac{1}{7}$ gu. = 3
12s.

17. $\frac{4}{7}$ cwt. = 2 qr. 8 lb.
$\frac{3}{14}$ qr. = 0 6
2 qr. 2 lb.

18.
$\frac{8}{11}$ ml. = 5 fu. 32 po. 4 yd.
$\frac{3}{4}$ fa. = 0 0 $1\frac{1}{2}$
5 fu. 32 po. $2\frac{1}{2}$ yd.

19.
$9\frac{1}{12}$ gu. = £9, 10s. 9d.
£$7\frac{4}{11}$ = 7 7 $3\frac{1}{4}$ $\frac{1}{11}$
£2, 3s. $5\frac{1}{2}$d. $\frac{10}{11}$

20. $\frac{27}{38} - \frac{3}{4}$ of $\frac{27}{38} = \frac{108-81}{152}$
$= \frac{27}{152}$

21.
$13\frac{5}{8}$ yd. = 13 yd. 2 qr. 2 nl.
$7\frac{3}{4}$ yd. = 7 3 0
5 yd. 3 qr. 2 nl.

22.
$1-\left(\frac{25+6}{70}\right) = 1-\frac{31}{70} = \frac{39}{70}$

23. $1-\left(\frac{35+32}{112}\right) = 1-\frac{67}{112} = \frac{45}{112}$ ga.

MULTIPLICATION OF VULGAR FRACTIONS.

1. $\frac{4}{5} \times \frac{11}{12} = \frac{1}{5} \times \frac{11}{3} = \frac{11}{15}$
2. $\frac{4}{13} \times \frac{4}{27} = \frac{16}{351}$
3. $\frac{12}{37} \times \frac{18}{43} = \frac{216}{1591}$
4. $\frac{7}{11} \times \frac{8}{15} = \frac{56}{165}$
5. $\frac{9}{11} \times \frac{35}{88} = \frac{315}{968}$
6. $\frac{8}{1} \times \frac{5}{7} = \frac{40}{7} = 5\frac{5}{7}$
7. $\frac{35}{4} \times \frac{5}{12} = \frac{175}{48} = 3\frac{31}{48}$
8. $\frac{7}{1} \times \frac{5}{13} = \frac{35}{13} = 2\frac{9}{13}$
9. $\frac{16}{1} \times \frac{3}{4} = 4 \times 3 = 12$
10. $\frac{43}{8} \times \frac{45}{4} = \frac{1935}{32} = 60\frac{15}{32}$
11. $\frac{291}{16} \times \frac{47}{4} = \frac{13677}{64} = 213\frac{45}{64}$
12. $\frac{29}{8} \times \frac{29}{6} = \frac{841}{48} = 17\frac{25}{48}$
13. $\left(\frac{10}{63}+\frac{15}{63}\right)\times\frac{140}{3}-\frac{4}{3} = \frac{25}{63}\times\frac{136}{3} = \frac{3400}{189} = 17\frac{187}{189}$
14. $\left(\frac{159}{4}-\frac{4}{7}\right)\times\left(\frac{18}{35}+\frac{40}{7}\right) = \frac{1113-16}{28}\times\frac{18+200}{35} = \frac{1097}{28}\times\frac{218}{35}$
$= \frac{119573}{490} = 244\frac{13}{490}$

15. $£\frac{17}{18} \times \frac{5}{8} = £\frac{85}{144} =$ 11s. $9\frac{1}{2}$d. $\frac{2}{3}$
16. $£\frac{25}{11} \times \frac{3}{7} = £\frac{75}{77} =$ 19s. $5\frac{3}{4}$d. $\frac{5}{77}$
17. $\frac{131}{18}$s. $\times \frac{192}{11} = \frac{4192}{33}$s. $=$ 127s. $0\frac{1}{4}$d. $\frac{5}{11} =$ £6, 7s. $0\frac{1}{4}$d. $\frac{5}{11}$
18. $\frac{38}{7}$d. $\times \frac{188}{5} \times \frac{5}{4} = \frac{1786}{7}$d. $= 255\frac{1}{7}$d. $=$ 21s. $3\frac{1}{7}$d.
19. $£\frac{29}{8} \times \frac{5}{84} = \frac{145}{672} =$ 4s. $3\frac{3}{4}$d. $\frac{1}{7}$
20. $£\frac{254}{5} \times \frac{303}{1260} = £\frac{12827}{1050} =$ £12, 4s. $3\frac{3}{4}$d. $\frac{19}{35}$

DIVISION OF VULGAR FRACTIONS.

1. $\frac{11}{15} \times \frac{12}{11} = \frac{4}{5}$
2. $\frac{16}{351} \times \frac{27}{4} = \frac{4}{13}$
3. $\frac{216}{1591} \times \frac{43}{18} = \frac{12}{37}$
4. $\frac{56}{165} \times \frac{15}{8} = \frac{7}{11}$
5. $\frac{315}{968} \times \frac{11}{9} = \frac{35}{88}$
6. $\frac{40}{7} \times \frac{7}{5} = 8$
7. $\frac{175}{48} \times \frac{12}{5} = \frac{35}{4} = 8\frac{3}{4}$
8. $\frac{35}{18} \times \frac{18}{5} = 7$
9. $\frac{12}{1} \times \frac{4}{3} = 4 \times 4 = 16$
10. $\frac{1935}{32} \times \frac{4}{45} = \frac{43}{8} = 5\frac{3}{8}$
11. $\frac{13677}{64} \times \frac{4}{47} = \frac{291}{16} = 18\frac{3}{16}$
12. $\frac{841}{48} \times \frac{6}{29} = \frac{29}{8} = 3\frac{5}{8}$

13. $(\frac{13}{3} + \frac{2}{1}) \div (\frac{57}{16} - \frac{25}{108}) = \frac{19}{3} \div \frac{1539-100}{432} = \frac{19}{3} \times \frac{432}{1439} =$
$\frac{2736}{1439} = 1\frac{1297}{1439}$
14. $(\frac{117}{22} - \frac{8}{25}) \div (1 + \frac{16}{9}) = \frac{2925-176}{550} \div \frac{25}{9} = \frac{2749}{550} \times \frac{9}{25} =$
$\frac{24741}{13750} = 1\frac{10991}{13750}$
15. $\frac{311}{8}$s. $\times \frac{7}{54} = \frac{2177}{432}$s. $=$ 5s. $0\frac{1}{4}$d. $\frac{8}{9}$
16. $£\frac{217}{15} \times \frac{11}{195} = £\frac{2387}{2925} =$ 16s. $3\frac{3}{4}$d. $\frac{83}{195}$
17. $£\frac{435}{8} \times \frac{5}{406} = £\frac{75}{112} =$ 13s. $4\frac{1}{2}$d. $\frac{6}{7}$
18. $1 \div \frac{131}{18} = \frac{18}{131}$, the part done in one day.
19. $(\frac{327 \times 12}{8} \times \frac{131 \times 12}{4}) \div (\frac{69}{5} \times \frac{29}{4}) = \frac{981}{2} \times \frac{393}{1} \times \frac{20}{69 \times 29} =$
$\frac{1285110}{667} = 1926\frac{468}{667}$ stones.
20. $£\frac{10787}{11} \times \frac{7}{150} = £\frac{75509}{1650} =$ £45, 15s. $3\frac{7}{55}$d.
$£\frac{1000}{1} \times \frac{8}{341} = £\frac{8000}{341} =$ £23, 9s. $2\frac{1}{4}$d. $\frac{339}{341}$

EXERCISES IN VULGAR FRACTIONS.

1. $12 = 11\frac{1}{1}$; $23 = 22\frac{2}{2}$; $34 = 33\frac{3}{3}$; $45 = 44\frac{4}{4}$
2. $10 = 9\frac{9}{9}$; $100 = 99\frac{9}{9}$; $1000 = 999\frac{9}{9}$
3. $\frac{31}{8}$lb. $+ \frac{71}{72}$lb. $+ \frac{139}{1920}$lb. $= \frac{22320+5680+417}{5760}$ lb. $= \frac{28417}{5760}$ lb.;
and $£\frac{67}{12} \times \frac{28417}{5760} = £\frac{1903939}{69120} =$ £27, 10s. $10\frac{3}{4}$d. $\frac{43}{72}$
4. $1 - (\frac{3}{20} + \frac{10}{21}) = 1 - \frac{63+200}{420} = 1 - \frac{263}{420} = \frac{157}{420}$, the part remaining.

5. 70 ga.—$(\frac{315}{16}+\frac{45}{2}+12)$ gal. $= 70—54\frac{3}{16} = 15\frac{13}{16}$ gal.
6. 3 pk.—$\frac{7}{11}$ pk. $= 2\frac{4}{11}$ pk.; $\frac{112}{70}$ pt.—$\frac{65}{70}$ pt. $= \frac{47}{70}$ pt.
7. $\frac{19}{4}$ lb.$\times\frac{17}{4}\times\frac{27}{8}\times\frac{259}{144} = \frac{250971}{2048}$ lb. $= 122\frac{1115}{2048}$ lb.
8. $\frac{88}{5}$d.$\times\frac{57}{8}\times\frac{281}{144} = \frac{58729}{240}$d. $= 244\frac{1}{2}$d.$\frac{49}{60} =$ 20s. $4\frac{1}{2}$d.$\frac{49}{60}$
9. $\frac{4}{5}$ of $\frac{7}{8}$ of £3000 = £300×7 = £2100
10. £$\frac{6135}{7}\times\frac{5}{58} =$ £$\frac{30675}{406} =$ £75, 11s. $1\frac{1}{203}$d.
11. No. of shares is $4\frac{2}{3}$; hence, £$\frac{392}{5}\times\frac{3}{14} =$ £$\frac{84}{5} =$ £16, 16s., a man's share, and £16, 16s. ÷ 3 = £5, 12s., a woman's share.
12. £396 ÷ $\frac{3}{5}$ of $\frac{2}{3} =$ £396$\times\frac{5}{2} =$ £198×5 = £990
13. $\frac{4}{11} = 76 \therefore \frac{1}{11} = 19$ and $\frac{11}{11} = 209$, the number.
14. $1—\frac{2}{5} = 942$ or $\frac{3}{5} = 942$; $\frac{1}{5} = 314$, and $\frac{5}{5} = 1570$
15. $\frac{5}{8}$ of 70s. $= \frac{175}{4}$s., and 10 gu. = 210s.; hence, $\frac{175}{4} \div 210 = \frac{175}{840} = \frac{5}{24}$
16. $\frac{5}{12}$ of $(66—6) = \frac{5}{12}$ of $60 = 25$, and $25+6 = 31$ years, son's age.
17. $\frac{1}{4}+\frac{1}{5}+\frac{1}{6} = \frac{15+12+10}{60} = \frac{37}{60}$, the part done in 1 day.
18. $\frac{3}{10}—\frac{1}{6} = \frac{9—5}{30} = \frac{4}{30} = \frac{2}{15}$, the part done by B in 1 day.
19. $7+(8\times\frac{1}{3})+(9\times\frac{1}{4}$ of $\frac{1}{3}) = 7+2\frac{2}{3}+\frac{3}{4} = 10\frac{5}{12}$, No. of shares; hence, 41 cwt. 1 qr. 5 lb. $\times\frac{12}{125} =$ 3 cwt. 3 qr. 24 lb., a man's share; 3 cwt. 3 qr. 24 lb. $\times\frac{1}{3} =$ 1 cwt. 1 qr. 8 lb., a woman's share; and 1 cwt. 1 qr. 8 lb. $\times\frac{1}{4} =$ 1 qr. 9 lb., a child's share.
20. $\frac{750+189—325}{45}\times\frac{5}{16}\div\frac{29}{11} = \frac{614}{45}\times\frac{5}{16}\times\frac{11}{29} = \frac{3377}{2088} = 1\frac{1289}{2088}$
21. $\frac{11}{18}—\frac{7}{18} = \frac{4}{18} =$ £3696; hence, £3696$\times\frac{9}{2} =$ £16632
22. $\frac{7}{9} — \frac{1}{3}$ of $\frac{7}{9} = \frac{7}{9} — \frac{7}{27} = \frac{14}{27}$, and $\frac{14}{27} — \frac{1}{2}$ of $\frac{14}{27} = \frac{7}{27}$, part left; and £4500$\times\frac{7}{27} =$ £$1166\frac{2}{3}$, the value.
23. $(24\frac{8}{12}+18\frac{11}{12})$ in.$\times2\times11\frac{1}{6}$ in.$\times\frac{1}{9}\times\frac{4}{3} = \frac{523}{12}\times\frac{67}{3}\times\frac{4}{27} = \frac{523}{3}\times\frac{67}{3}\times\frac{1}{27} = \frac{35041}{243}$ yd. $= 144\frac{49}{243}$ yards.
24. $\frac{3}{5}$ of 20s. = 12s. per £1
25. $(\frac{5}{9}$ of $\frac{21}{5}$ of $\frac{36}{1})\times(\frac{7}{5}$ of $\frac{3}{50})\times(\frac{20}{11}$ of $\frac{22}{3}) = \frac{84}{1}\times\frac{21}{250}\times\frac{40}{3} = \frac{2352}{25} = 94\frac{2}{25}$, the number.
26. $1 — (\frac{9+12+16}{144}) = 1—\frac{37}{144} = \frac{107}{144} = 111$ coins; hence, $111\times\frac{144}{107} = 149\frac{41}{107}$ coins.
27. $\frac{19}{25}\times\frac{5760}{7000}$ lb. avoir. $= \frac{2736}{4375}$ lb. avoir.
28. $\frac{56}{5}$d. $\times\frac{107}{6} = \frac{2996}{15}$d. $= 199\frac{11}{15}$d. = 16s. $7\frac{1}{2}$d. $\frac{14}{15}$

29. 7 + (8 × $\frac{3}{4}$) + (15 × $\frac{4}{5}$ of $\frac{3}{4}$) = 7 + 6 + 9 = 22, No. of shares; hence, £534, 11s. 6$\frac{1}{2}$d. ÷ 22 = £24, 5s. 11$\frac{3}{4}$d., a man's share; £24, 5s. 11$\frac{3}{4}$d. × $\frac{3}{4}$ = £18, 4s. 5$\frac{3}{4}$d.$\frac{1}{4}$, a woman's share; and £24, 5s. 11$\frac{3}{4}$d. × $\frac{3}{5}$ = £14, 11s. 7$\frac{1}{20}$d., a child's share.

30. In 2$\frac{1}{2}$ hours A has gone 20 × 2$\frac{1}{2}$ = 50 miles; hence, 50 ÷ (26$\frac{2}{3}$ − 20) = 50 ÷ 6$\frac{2}{3}$ = 7$\frac{1}{2}$ hours, when B will overtake A; and 50 + (7$\frac{1}{2}$ × 20) = 200 miles travelled.

31. $\frac{5}{2}$, $\frac{4}{3}$, $\frac{6}{5}$ = $\frac{75,\ 40,\ 36}{30}$; hence, 75, 40, and 36 are the required numbers, since $\frac{2}{5}$ of 75 = 30, $\frac{3}{4}$ of 40 = 30, and $\frac{5}{6}$ of 36 also = 30

32. ($\frac{1}{2}$ + $\frac{1}{3}$) of his men + 40 men = $\frac{5}{6}$ of his men + 40 men = the whole number; hence, what $\frac{5}{6}$ wants of being unity, *i.e.*, $\frac{1}{6}$ of his men is 40, and, therefore, 40 × 6 = 240 men.

SIMPLE PROPORTION.

1. 4 yd. : 24 yd. : : 3s.
3
4)72
18s.

2. 24 yd. : 4 yd. : : 18s.
18
24)72
3s.

3. 3s. : 18s. : : 4 yd.
4
3)72
24 yd.

4. 18s. : 3s. : : 24 yd.
3
18)72
4 yd.

5. 24 yd. : 141 yd. : : 36s.
2 3 3
2)423
2,0)21,1s. 6d.
£10, 11s. 6d.

6. 8 yd. : 51 yd. : : 32s.
4 4
2,0)20,4s.
£10, 4s.

7. 7 yd. : 49 yd. : : 25s.
7 7
2,0)17,5s.
£8,15s.

8. 17 yd. : 307 yd. : : 85s.
17)26095
2,0)153,5s.
£76, 15s.

9. 7 yd. : 99 yd. :: 126d.
7)12474
12)1782d.
2,0)14,8s. 6d.
£7, 8s. 6d.

10. 1,00yd. : 37 yd. :: 13,00d.
12)481d.
40s. 1d.

11. 68 yd. : 7 yd. :: 359s. 10d.
7 × 4318d.
68)30226
12)444½d.
37s. 0½d.

12. 57 yd. : 98¾ yd. :: £8, 11s.
4 4 171s.
228 395 × 171
228)67545
2,0)29,6s. 3d.
£14, 16s. 3d.

13. 19 lb. : 3 cwt. 17 lb. :: 95s.
353 lb. × 95
19)33535
2,0)176,5s.
£88, 5s.

14\.
47yd. : 117yd. :: £34, 10s. 3¾d.
690s.
8283d.
117 × 33135 qr.
47)3876795
4)82485 qr.
12)20621¼d.
2,0)171,8s. 5¼d.
£85, 18s. 5¼d.

15\.
57yd. : 152yd. :: £55, 4s. 4½d
1104s.
13252d.
152 × 26505 hd.
57)4028760
24)70680 hd.
2,0)294,5s.
£147, 5s.

hhd. hhd.
16. 41 : 33 :: £287, 2s. 6¾d.
5742s.
68910d.
33 × 275643 qr.
41)9096219
4)221859 qr.
12)55464¾d.
2,0)462,2s. 0¾d.
£231, 2s. 0¾d.

17\.
lb cwt. qr.
51 : 19 1 :: £19, 12s. 0¾d.
2156 lb. 392s.
4704d.
2156 × 18819 qr.
51)40573764
4)795564 qr.
12)198891d.
2,0)1657,4s. 3d.
£828, 14s. 3d.

qrs. qrs. lb.
18. 837900 : 7125 :: 1652
837900)11770500
$14\frac{1}{21}$ lb.

qrs. qrs.
19. 525 : 9450 : : 14 lb.
525)132300
112)252 lb.
2 cwt. 1 qr.

qrs. qrs.
20. 45180 : 1779 : : 30 cwt.
45180)53370
1 cwt. 20$\frac{76}{251}$ lb.

21.
da. da.
365 : 73 : : £37, 4s. 1d.
5
£7, 8s. 9$\frac{3}{4}$d. $\frac{1}{5}$

22.
17 yd. : 75 yd. : : 99s. 11$\frac{1}{2}$d.
75 × 2399 h.d.
17)179925
2)10583$\frac{1}{4}$ h.d. $\frac{11}{17}$
12)5291$\frac{3}{4}$d. $\frac{11}{17}$
2,0)44,0s. 11$\frac{3}{4}$d. $\frac{11}{17}$
£22, 0s. 11$\frac{3}{4}$d. $\frac{11}{17}$

23.
100 qrs. : 285 qrs. : : 350d.
100)99750
12)997$\frac{1}{2}$d.
2,0)8,3s. 1$\frac{1}{2}$d.
£4, 3s. 1$\frac{1}{2}$d.

24. 84 qr. : 38 qr. : : 172s.
84)6536
77s. 9$\frac{1}{2}$d. $\frac{6}{7}$

qrs. qrs.
25. 141 : 1224 : : 4856d.
141)5943744
12)42154$\frac{10}{47}$d.
2,0)351,2s. 10$\frac{10}{47}$d.
£175, 12s. 10$\frac{10}{47}$d.

26. 1 lb. : 88$\frac{1}{2}$ lb. : : 5$\frac{3}{4}$d.
23 23 qr.
4)2035$\frac{1}{2}$ qr.
12)508$\frac{3}{4}$d. $\frac{1}{2}$
42s. 4$\frac{3}{4}$d. $\frac{1}{2}$

27.
18 lb. : 6370 lb. : : 184$\frac{1}{2}$d.
18)1175265
12)65292$\frac{1}{2}$d.
2,0)544,1s. 0$\frac{1}{2}$d.
£272, 1s. 0$\frac{1}{2}$d.

28.
gal. gal.
54 : 3031 : : 1039d.
54)3149209
12)58318$\frac{1}{2}$d. $\frac{20}{27}$
2,0)485,9s. 10$\frac{1}{2}$d. $\frac{20}{27}$
£242, 19s. 10$\frac{1}{2}$d. $\frac{20}{27}$

29.
per. per.
160 : 33135 : : 6450d.
160)213720750
12)1335754$\frac{1}{2}$d. $\frac{3}{4}$
2,0)11131,2s. 10$\frac{1}{2}$d. $\frac{3}{4}$
£5565,12s. 10$\frac{1}{2}$d. $\frac{3}{4}$

30.
pt. pt.
288 : 27655 : : 1762 qr.
288)48728110
4)169194$\frac{119}{144}$ qr.
12)42298$\frac{1}{2}$d. $\frac{119}{144}$
2,0)352,4s. 10$\frac{1}{2}$d. $\frac{119}{144}$
£176, 4s. 10$\frac{1}{2}$d. $\frac{119}{144}$

31.
23s. 4d. : 9$\frac{3}{4}$d. : : 97$\frac{1}{2}$ yd.
1120 f. 39f.×112 195 h.y.
10 39×195
10)7605
380$\frac{1}{4}$ yd. = 760$\frac{1}{2}$ h. yd.

32.
936 yd. : 156 yd. : : 202d.
6 1 × 202
6)202
12)33$\frac{1}{2}$d. $\frac{2}{3}$
2s. 9$\frac{1}{2}$d. $\frac{2}{3}$

33.
67 cwt. at 8 gu. = 135072d.
600 lb. at 88d. = 52800
2s. 8d. = 32d.)82272d.
2571 pairs

34. gal. 84 : gal. 17 : : 756s.
84)12852
2,0)15,3s.
£7, 13s.

35.
dwt. 1440 : dwt. 6825 : : 378s.
1440)2579850
2,0)179,1s. 6$\frac{3}{4}$d.
£89, 11s. 6$\frac{3}{4}$d.

36. gal. 49 : gal. 574 : : 990d.
49)568260
12)11597$\frac{1}{7}$d.
2,0)96,6s. 5$\frac{1}{7}$d.
£48, 6s. 5$\frac{1}{7}$d.

37.
11 lb. : 886 lb. : : 210 qrs.
11)186060
£17,12s.4$\frac{1}{2}$d.$\frac{6}{11}$=16914$\frac{6}{11}$qr.

38.
7 lb. : 1707 lb. : : 1617 hd.
7)2760219
£821,9s. 10$\frac{1}{2}$d.=394317 h.d.

39. 17 lb. : 352 lb. : : 85d.
17)29920
£7, 6s. 8d. = 1760d.

40.
28 st. : 6384 st. : : 13307 qr.
28)84951888
£3160, 8s. 3d. = 3033996 qr.

41. men. 72 : men. 42 : : days. 108
72)4536
63 days

42. 9 da. : 4 da. : : 18 men
2 2
8 men

43. men. 37 : men. 57 : : days. 156
37)8892
240$\frac{12}{37}$ days

44. 9 da. : 36 da. : : 28 per.
4 4
112 per.

45.
45d. : 48d. :: 70 oz.
45)3360
16)74 oz. $10\frac{2}{3}$ drs.
4 lb. 10 oz. $10\frac{2}{3}$ dr.

46.
$691\frac{1}{5}$ oz. : 768 oz. :: 54d.
3456 3840 × 54
3456)207360
5s. = 60d.

47. 1008d. × 84 = 84672d. price of wheat
$\frac{3}{8}$ of 84672d. = 31752d. 〃 〃 rum
52920d. 〃 〃 sugar

then, $\frac{31752}{200} = 158\frac{12}{25}$ gallons of rum

$\frac{52920}{8\frac{1}{2}} = 6225\frac{15}{17}$ lb. of sugar

48.
2 : 7 :: 154 yd.
2)1078
539 yd. of muslin

7 : 2 :: 14s. 10d.
7)29s. 8d.
4s. $2\frac{3}{4}$d. $\frac{3}{7}$

49. $9\frac{1}{2}$d. + $5\frac{1}{4}$d. = $14\frac{3}{4}$d.
$14\frac{3}{4}$d. : 92d. :: 456 pairs
59 368 × 456
59)167808
$2844\frac{12}{59}$ lb. of each

50. 8 mo. : 6 mo. :: 2000 men
8)12000
1500 men

51. £1925 : £275 :: 9 mo.
1925)2475
1 mo. 1 w. 1 d.

52. h. cwt. h. cwt.
3575 : 39 :: 18150s.
3575)707850
2,0)19,8s.
£9, 18s.

53. 58 oz. : 12 oz. :: 5974d.
58)71688
£5, 3s. = 1236d.

54. 1 lb. : $26\frac{1}{4}$ lb. :: 1158d.
4 105 105
4)121590
£126, 13s. $1\frac{1}{2}$d. = $30397\frac{1}{2}$d.

55. 25s. : 34s. :: 3 lb.
25)102
4 lb. 1 oz. $4\frac{12}{25}$ drs.

56.
$825\frac{29}{75}$ drs. : 1168 drs. :: 318d.
61904 87600 × 318
61904)27856800
£1, 17s. 6d. = 450d.

57.
96 ga. at 23s. 8d. = 27264d.
60 guineas = 15120d.
450)12144d.
2s. $2\frac{3}{4}$d. $\frac{71}{75}$ = $26\frac{3}{4}$d. $\frac{71}{75}$

58. 15s. : 18s. :: $13\frac{1}{3}$s.
15)240
16s.

59. (9d. × 4) + 16d. = 52d.
then, 52d. : 175s. :: 9 cwt.
2100d. × 9
52)18900
4 × $363\frac{6}{13}$ lb. flax
$1453\frac{11}{13}$ lb. hemp

60. £1 : £4678 :: $11\frac{1}{2}$s.
2,0)5379,7s.
£2689, 17s.

61.
7 mo. : 21 mo. :: 900 men
3 × 900
2700 men

62. £$\frac{2}{3}$: £490 :: £1
245
£735

63.
15 mo. : 6 mo. :: 1000 men
15)6000
400 men

64. 5 qr. : 4 qr. :: $37\frac{1}{2}$ yd
5)150
30 yd.

65. £1 : £340 :: $3\frac{1}{2}$s.
2,0)119,0s.
£59, 10s.

66. £960 : £504 :: £1
960)10080s.
10s. 6d.

67.
12 mo. : 10 mo. :: 16 oz.
12)160
13 oz. $5\frac{1}{3}$ dr.

68.
$12\frac{1}{2}$ oz. : 15 oz. :: 8 mo.
25)240
9 mo. 18 days

69. £100 : £1750 :: £5
10,0)87,50
£87, 10s.

70.
£100 : £256, 18s. :: £$2\frac{1}{2}$
1,00)£642, 5s.
£6, 8s. $5\frac{1}{4}$d. $\frac{3}{5}$

71. £100 : £650 :: £4
1,00)£26,00

72. £100 : £255 :: 4s.
1,00)10,20s.
10s. $2\frac{1}{4}$d. $\frac{3}{5}$

73. £100 : £375 :: £$2\frac{1}{2}$
100)£937, 10s.
£9, 7s. 6d.

74. £425 : £100 :: 4845d.
425)484500
1140d.
£4, 15s.

75.
13s. × 7 + 22s. × 3 = 157s.
157s. : 93s. : : 27
157)2511
$15\frac{156}{157}$
then, $15\frac{156}{157} \times 7 = 111\frac{150}{157}$ st. wool
$15\frac{156}{157} \times 3 = 47\frac{154}{157}$ st. butter

76. 42s. : 45s. : : 16s. 6d.
14 15 15
14)247 6
A = 17s. $8\frac{1}{7}$d.

also, 42s. : $16\frac{1}{2}$s. : : 96 gal.
84 33 × 8
7 7)264
$37\frac{5}{7}$ doz.

77. £5 : $1285\frac{1}{2}$s. : : £100
£1285, 10s.

78. 6 mo. : 8 mo. : : £125
6)1000
£166, 13s. 4d.

79.
435ml. : 87ml. : : 10h. 30min.
5
2ho. 6min.

80. 84s. : 91s. : : 192 qr.
12 13 × 16
208 qr.

81. 8d. : 10d. : : 56 loaves
8)560
70 loaves

82. 35 ac. : 20 ac. : : £21
35)420
£12 per acre

83. $5\frac{3}{4}$ gal. : $6\frac{2}{5}$ gal. : : 230 gal.
1380
92
$5\frac{3}{4}$) 1472
23) 5888
256 gal.

84. 11 : 12 : : 6 ho.
11)72
6 ho. $32\frac{8}{11}$ min.

85. 432 ft. : 660 ft. : : 342s.
432)225720
2,0)52,2s. 6d.
£26, 2s. 6d.

86.
90d. : 63d. : : 81 yd.
10 7 7
10)567 [$3\frac{1}{5}$nl.
56 yd. 2 qr.

87.
369 qr. : 18819 qr. : : 1 yd.
51 yd.

88.
78 ml. : 130 ml. : : $169\frac{1}{2}$ cwt.
78)22035
282 cwt. 2 qr.

89. 128 yd. : 64yd. : : 2s. 8d.
2
1s. 4d.

90.
21,0 cwt. : 6,0 cwt. : : 120 ml.
21)720
$34\frac{2}{7}$ ml.

91. $7\frac{1}{2}$s. : $2\frac{1}{2}$s. : : 9s.
3 3s.

92.
15 sixd. : 10 sixd. : : 756 yd.
15)7560
504 yd.

93.
£172, 5s. × 32 = £5512
then, £105 : £100 : : £5512
105)551200
Val. returned, £5249$\frac{11}{21}$
also, 44s. : £2624$\frac{16}{21}$: 1 cwt.
44)52495$\frac{5}{21}$s.
1193$\frac{17}{231}$cwt.sug.
$4\frac{2}{3}$s. : 52495$\frac{5}{21}$s. : : 1 gal.
14)157485$\frac{5}{7}$
11248$\frac{48}{49}$ gal. rum

94. 3 qr. : 5 qr. : : 90 yd.
3)450
150 yd.

95.
9 six. d. : 15 six. d. : : 84 yd.
9)1260
140 yd.

96.
5 sec. : 3600 sec. : : 36 yd.
5)129600
25920 yd.

97.
378 ga. — 42 ga. = 336 ga.
Hence,
336 ga. : 84 ga. : : £160, 13s. 0d.
4 £40, 3s. 3d.

98. $\frac{3}{5}$ yd. : $4\frac{3}{4}$ yd. : : £$\frac{7}{18}$: $\frac{5}{3} \times \frac{19}{4} \times$ £$\frac{7}{18}$ = £$\frac{665}{216}$ = £3, 1s. $6\frac{3}{4}$d. $\frac{5}{9}$
99. $\frac{3}{4}$ yd. : $5\frac{3}{7}$ yd. : : $7\frac{1}{2}$s. : $\frac{4}{3} \times \frac{38}{7} \times \frac{15}{2}$s. = $\frac{380}{7}$s. = 54s. $3\frac{1}{4}$d. $\frac{5}{7}$
100. $3\frac{5}{7}$ lb. : $\frac{7}{12}$ lb. : : $\frac{377}{24}$s. : $\frac{7}{26} \times \frac{7}{12} \times \frac{377}{24}$s. = $\frac{1421}{576}$s. = 2s. $5\frac{1}{2}$d. $\frac{5}{12}$
101. $\frac{7}{9}$ cwt. : $8\frac{3}{4}$ cwt. : : $\frac{44}{3}$s. : $\frac{9}{7} \times \frac{35}{4} \times \frac{44}{3}$s. = 165s. = £8, 5s.
102. 1 yd. : $15\frac{5}{8}$ yd. : : $\frac{35}{4}$s. : $\frac{125}{8} \times \frac{35}{4}$ = $\frac{4375}{32}$s. = 136s. $8\frac{1}{2}$d. $\frac{1}{2}$
103. 28 qr. : 71 qr. : : $\frac{35}{3}$s. : $\frac{71}{28} \times \frac{35}{3}$s. = $\frac{355}{12}$s. = 29s. 7d.
104. $1\frac{1}{8}$ lb. : 1050 lb. : : $\frac{67}{12}$s. : $\frac{8}{9} \times \frac{1050}{1} \times \frac{67}{12}$s. = $\frac{46900}{9}$s. = 5211s. $1\frac{1}{4}$d. $\frac{1}{3}$ = £260, 11s. $1\frac{1}{4}$d. $\frac{1}{3}$
105. $\frac{4}{7}$: $\frac{1}{5}$: : £920 : $\frac{7}{4} \times \frac{1}{5} \times$ £920 = £322
106. $\frac{13}{14}$: $\frac{56}{117}$: : £$\frac{18}{5}$: $\frac{14}{13} \times \frac{56}{117} \times$ £$\frac{18}{5}$ = £$\frac{1568}{845}$ = £1, 17s. $1\frac{1}{4}$d. $\frac{67}{169}$
107. $\frac{100}{12}$s. × $\frac{5}{4}$: $10\frac{1}{2}$s. : : $\frac{223}{4}$ yd. : $\frac{12}{125} \times \frac{21}{2} \times \frac{223}{4}$ yd. = $\frac{14049}{250}$ yd. = 56$\frac{49}{250}$ yd.
108. $6\frac{5}{12}$ ft. : $220\frac{1}{2}$ ft. : : $5\frac{10}{12}$ ft. : $\frac{12}{77} \times \frac{441}{2} \times \frac{70}{12}$ ft. = $\frac{2205}{11}$ ft. = 200 ft. $5\frac{5}{11}$ in.
109. $\frac{7}{11}$: $\frac{17}{24}$: : £360 : $\frac{11}{7} \times \frac{17}{24} \times$ £$\frac{360}{1}$ = £$\frac{2805}{7}$ = £400, 14s. $3\frac{1}{4}$d. $\frac{5}{7}$
110. £$204\frac{1}{5}$: £$454\frac{3}{5}$: : $6\frac{1}{8}$ mo. : $\frac{5}{1021} \times \frac{2273}{5} \times \frac{49}{8}$ mo. = $\frac{111377}{8168}$ mo. = 13 mo. 19$\frac{299}{4084}$ da.

111. $\frac{1}{18}+\frac{1}{20}+\frac{1}{24}=\frac{20+18+15}{360}=\frac{53}{360}$ pt. done by A, B, and C, in 1 day; hence $\frac{53}{360}:1::1$ da. : $\frac{360}{53}$ da. $=6\frac{42}{53}$ days.

112. $1\frac{5}{7}$ oz. : $1\frac{2}{7}$ lb. :: £$\frac{5}{8}$: $\frac{7}{12}\times\frac{108}{7}\times$ £$\frac{5}{8}=$ £$\frac{45}{8}=$ £5, 12s. 6d.

113. $18\frac{6}{7}$ lb. : $13\frac{1}{2}$ oz. :: £$\frac{264}{5}$: $\frac{7}{132}\times\frac{27}{24}\times$ £$\frac{264}{5}=$ £$\frac{63}{20}=$ £3, 3s.

114. $\frac{5}{8}$ yd. : $\frac{9}{8}$ yd. :: $\frac{23}{6}$s. : $\frac{9}{5}\times\frac{23}{6}$s. $=\frac{69}{10}$s. $=$ 6s. $10\frac{3}{4}$d. $\frac{1}{5}$

115. $\frac{1}{2}+\frac{1}{4}+\frac{1}{5}+\frac{1}{8}+\frac{1}{10}+\frac{1}{20}+\frac{1}{40}=\frac{5}{4}$, and $\frac{1}{2}+\frac{1}{4}+\frac{1}{5}+\frac{1}{10}+\frac{1}{20}$ $=\frac{11}{10}$, hence, $\frac{11}{10}:\frac{10}{10}::110:100$ goats; also, $\frac{5}{4}:1::$ $100\times5:400$ sheep.

116. $(\frac{1}{9}+\frac{2}{17}+\frac{4}{27}):1::1$ ho. : $\frac{459}{173}$ ho. $=2\frac{113}{173}$ ho. by the 3

117. $\frac{1}{8}-(\frac{1}{25}+\frac{1}{22}):1::1$ da. : $\frac{2200}{87}$ da. $=25\frac{25}{87}$ da. by C.

COMPOUND PROPORTION.

1.

Boats, 600 : 3 :: 1 wk.
Herring, 4500 : 14000000
9)140
15wk. $3\frac{1}{3}$da.

2.

Copies, 3000 : 5000 :: 66 re.
Sheets, 11 : $12\frac{1}{2}$ 2
1 5
1 $12\frac{1}{2}$
$62\frac{1}{2}\times2$
125 reams

3. Yd. $2\frac{1}{2}$: 150 :: 12 oz.
qrs. 6 : 4 2
1 60
1 4
240×2
16)480 oz.
30 lb.

4. £10,0 : £165,0 :: £5
Mo. 12 : 42 1
2 165
2 7
4 4)1155
£288, 15s.

5. £100 : £675 :: £5
Days, 365 : 438 1
2 27
1 3
2 2)81
£40, 10s.

6.

Men, 15 : 74 :: 37 ro.
Days, 27 : 63
15 74
3 7
45 518×37
45)19166
$425\frac{41}{45}$ roods

7.

Men, 84 : 96 :: 72 ac.
Da., 15 : 12
7 8
5 4
35 32×72
35)2304
65 ac. 3 ro. $12\frac{4}{7}$ p.

8. £6,00 : £1,00 :: £45
Mo. 18 : 12 5
1 1
£5 per cent.

9. £100 : £650 : : £5
Da. 365 : 173 1
2 13
73 173
146)2249
£15, 8s. $0\frac{3}{4}$d. $\frac{69}{73}$

10. £100 : £375 : : £5
Wk. 52 : 37 1
4 75
52 37
208)2775
£13, 6s. $9\frac{3}{4}$d. $\frac{9}{13}$

11. £ £ £ s. d.
175 : 100 : : 5 18 $1\frac{1}{2}$
Wk. 39 52 0 16 $10\frac{1}{2}$
1 4 0 5 $7\frac{1}{2}$
1 4 16
16 £4, 10s. 0d.

12. £2,00 : £1,00 : : 56s.
Da. 146 : 365 28
1 : 5 × 14
£3, 10s. = 70s.

13. H. cr. 30 : 705 : : £100
Ye. 5 : 1 10
1 47×10
£470

14. £975 : £100 : : 1 ye.
Pence 1040 : 45630
1 1
2 9
2) 9
$4\frac{1}{2}$ years

15.
Men, 236 : 76 : : 160 qr.
Da. 108 : 432
59 76×160
59)12160
$206\frac{6}{59}$ qr.

16. Days, 12 : 60 : : 360 ml.
Ho. 8 : 6 30
1 15
1 3
45×30
1350 miles

17. Men, 30 : 24 : : 36 days
Ho. 8 : 12 6
5 12
1 3
5 36×6
5)216
$43\frac{1}{5}$ days

18. Cwt. 90 : 30 : : 15 ml.
Pence, 1305 : 6960 1
3)80
$26\frac{2}{3}$ miles

19. Pence, 9 : 1 : : 10s.
Oz. 9 : 48
27 16×10
27)160
5s. $11\frac{1}{9}$d.

20. In. 16 : 12 : : 12 in.
In. 3 : 12
1 3×12
36 in. long

21. 54s. : 45s. : : 16s.
Men, 18 : 45 4
Da. 3 : 27
1 15
1 5
75×4
£15 = 300s.

22. Men, 12 : 8 : : 12 da.
Yd. 30 : 60 1
Ho. 6 : 8
3) 64
$21\frac{1}{3}$ da.

23. Men, 12 : 18 : : 60 ft.
Ft. 3 : 4 5
In. 12 : 20
Da. 24 : 18
Ho. 12 : 8
1 20×5
100 ft. long

24. Yd. $27\frac{1}{2} : 7\frac{3}{4} : : £10\frac{2}{3}$
13 : 11
$\frac{2}{55}\times\frac{11}{13}\times\frac{31}{4}\times£\frac{32}{3} =$
$£\frac{496}{195} = £2$, 10s. $10\frac{1}{4}$d. $\frac{11}{13}$

25. 105s. : 172s. : : 13 yd.
Qr. $\frac{10}{3}$: 3
$\frac{172}{105}\times\frac{3}{10}\times3\times13$ yd. =
$\frac{3354}{175} = 19\frac{29}{175}$ yd.

26. $2\frac{1}{2}$d. : 6d. : : $8\frac{2}{5}$ oz.
$8\frac{1}{4}$s. : 5s.
$\frac{2}{5}\times\frac{4}{33}\times\frac{30}{1}\times\frac{42}{5} = \frac{672}{55}$ oz.
= 12 oz. $3\frac{27}{55}$ dr.

27.
(1.) Men, 16 : 12 : : 16 da.
Ho. 8 : 10 1
1 : 5
3×5×5 =
The men alone take 75 da.

(2.) Boys, 30 : 25 : : 16 da.
Ho. 8 : 9 1
1 : 5
25×3
The boys take 75 days

Hence, $\frac{1}{75}+\frac{1}{75}=\frac{2}{75}$ pt. by the men and boys together in 1 day, and 75 ÷ 2 = $37\frac{1}{2}$ days taken by both.

PRACTICE.

CASE I.

1.
5s. = $£\frac{1}{4}$)£7916, va. at £1
£1979

2.
4s. = $£\frac{1}{5}$)£8945, va. at £1
£1789

3.
2s. = $£\frac{1}{10}$)£7386, va. at £1
£738, 12s.

4.
10s. = $£\frac{1}{2}$)£9374, va. at £1
£4687

5.
6s. 8d. = £$\frac{1}{3}$)£8539, va. at £1
£2846, 6s. 8d.

6.
3s. 4d. = £$\frac{1}{6}$)£7482, va. at £1
£1247

7.
2s. 6d. = £$\frac{1}{8}$)£5926, va. at £1
£740, 15s.

8.
1s. 8d. = £$\frac{1}{12}$)£8375, va. at £1
£697, 18s. 4d.

9.
1s. 4d. = £$\frac{1}{15}$)£7498, va. at £1
£499, 17s. 4d.

10.
1s. 3d. = £$\frac{1}{16}$)£7926, va. at £1
£495, 7s. 6d.

11.
G.
10s. 6d. = $\frac{1}{2}$ g.)4927, v. at 1 g.
2,0)2463 10s. 6d.
123 3 0
£2586, 13s. 6d.

12.
7s. = $\frac{1}{3}$ g.)7493 g., va. at 1 g.
2,0)2497 g. 14s.
124 17
£2622, 11s.

13.
G.
5s. 3d. = $\frac{1}{4}$ g.)5923, v. at 1g.
2,0)1480, 15s. 9d.
74
£1554, 15s. 9d.

14.
G.
3s. 6d. = $\frac{1}{6}$ g.)4729, v. at 1 g.
2,0)788 3s. 6d.
39 8 0
£827, 11s. 6d.

G.
15. 3s. = $\frac{1}{7}$ g.)4753, va. at 1g.
2,0)679 gn.
33 19s.
£712, 19s.

16.
G.
2s. 4d. = $\frac{1}{9}$ g.)9578, va. at 1g.
2,0)1064 g. 4s. 8d.
53 4
£1117, 8s. 8d.

17.
1s. 9d. = $\frac{1}{12}$g.)6759 g. va. at 1g.
2,0)563 g. 5s. 3d.
28 3
£591, 8s. 3d.

18.
1s. 6d. = $\frac{1}{14}$g.)8275g. va. at 1g.
2,0)591 g. 1s. 6d.
29 11
£620, 12s. 6d.

19. 6d. = $\frac{1}{2}$s.)7428s. va. at 1s.
2,0)371,4s.
£185, 14s.

20. 4d. = $\frac{1}{3}$s.)4930s. va. at 1s.
2,0)164,3s. 4d.
£82,3s. 4d.

21. 3d. = $\frac{1}{4}$s.)5726s. va. at 1s.
2,0)143,1s. 6d.
£71, 11s. 6d.

22. 2d. = $\frac{1}{6}$s. = 1492s. 10d.
£74, 12s. 10d.

23. 1$\frac{1}{2}$d. = $\frac{1}{8}$s. = 1248s. 6d.
£62, 8s. 6d.

24. 1d.=$\frac{1}{12}$s. = 405s. 2d.
£20, 5s. 2d.

25.
$\frac{3}{4}$d. = $\frac{1}{8}$s.d. = 941 sixd.
£23, 10s. 6d.

26.
$\frac{1}{2}$d.=$\frac{1}{12}$s.d. = 566 s.d. 1$\frac{1}{2}$d.
£14, 3s. 1$\frac{1}{2}$d.

27.
$\frac{1}{4}$d.=$\frac{1}{12}$th.d.=785th.d.1$\frac{1}{2}$d.
£9, 16s. 4$\frac{1}{2}$d.

28. 4s. = £$\frac{1}{5}$ = £1714, 16s.

29. 4d. = $\frac{1}{3}$s. = 2266s.
£113, 6s.

30. 6s. 8d. = £$\frac{1}{3}$ = £2464

31.
1s. 8d.=£$\frac{1}{12}$=£789, 16s. 8d.

32. 1$\frac{1}{2}$d.=$\frac{1}{8}$s.=717s. 4$\frac{1}{2}$d.
£35, 17s. 4$\frac{1}{2}$d.

33.
1s. 3d.=£$\frac{1}{16}$=£592, 13s. 9d.

34.
$\frac{1}{2}$d. = $\frac{1}{12}$s.d. = 477sixd. 2d.
£11; 18s. 8d.

35.
2s. 6d.=£$\frac{1}{8}$=£1181, 12s. 6d.

36. 3d.=$\frac{1}{4}$s.=2064s. 3d.
£103, 4s. 3d.

37.
3s. 4d.=£$\frac{1}{6}$=£1264, 6s. 8d.

38. 2d. = $\frac{1}{6}$s. = 1596s.
£79, 16s.

39. 2s. = £$\frac{1}{10}$ = £749, 6s.

40. $\frac{3}{4}$d.=$\frac{1}{8}$s.d.=1119s.d.3d.
£27, 19s. 9d.

41. 10s. = £$\frac{1}{2}$ = £4469

42.
1s. 4d.=£$\frac{1}{15}$=£631, 17s. 4d.

CASE II.

1.
2d. = $\frac{1}{6}$s. = 749s. 0d.
$\frac{1}{2}$d. = $\frac{1}{4}$ of 2d. = 124 10
31 2$\frac{1}{2}$
Va. at 2$\frac{1}{2}$d., 156 0$\frac{1}{2}$
£7, 16s. 0$\frac{1}{2}$d.

2.
1d. = $\frac{1}{12}$s. = 48s. 7d.
$\frac{1}{4}$d. = $\frac{1}{4}$d. = 12 1$\frac{3}{4}$
Va. at 1$\frac{1}{4}$d., 60 8$\frac{3}{4}$
£3, 0s. 8 d.

3.
1$\frac{1}{2}$d. = $\frac{1}{8}$s. = 94s. 9d.
$\frac{1}{4}$d. = $\frac{1}{6}$ of 1$\frac{1}{2}$d. = 15 9$\frac{1}{2}$
Va. at 1$\frac{3}{4}$d., 110 6$\frac{1}{2}$
£5, 10s. 6$\frac{1}{2}$d.

4.
2d. = $\frac{1}{6}$s. = 32s. 8d.
$\frac{1}{4}$d. = $\frac{1}{8}$ of 2d. = 4 1
Va. at 2$\frac{1}{4}$d., 36 9
£1, 16s. 9d.

5.
2d. = $\frac{1}{6}$s.d. = 327s.d. 4d.
$\frac{3}{4}$d. = $\frac{1}{8}$s.d. = 122 5$\frac{1}{4}$
Va. at 2$\frac{3}{4}$d., 449 9$\frac{1}{4}$
£11, 5s. 3$\frac{1}{4}$d.

6.
3d. = $\frac{1}{4}$s. = 141s. 9d.
$\frac{1}{4}$d. = $\frac{1}{12}$ of 3d. = 11 9$\frac{3}{4}$
Va. at 3$\frac{1}{4}$d., 153 6$\frac{3}{4}$
£7, 13s. 6$\frac{3}{4}$d.

7.
3d. = $\frac{1}{4}$s. = 239s. 6d.
$\frac{1}{2}$d. = $\frac{1}{6}$ of 3d. = 39 11
Va. at 3$\frac{1}{2}$d., 279 5
£13, 19s. 5d.

8.
3d. = $\frac{1}{4}$s. = 168s. 3d.
$\frac{3}{4}$d. = $\frac{1}{4}$ of 3d. = 42 0$\frac{3}{4}$
Va. at 3$\frac{3}{4}$d., 210 3$\frac{3}{4}$
£10, 10s. 3$\frac{3}{4}$d.

9.
4d. = $\frac{1}{3}$s. = 319s. 4d.
$\frac{1}{4}$d. = $\frac{1}{16}$ of 4d. = 19 11$\frac{1}{2}$
Va. at 4$\frac{1}{4}$d., 339 3$\frac{1}{2}$
£16, 19s. 3$\frac{1}{2}$d.

10.
3d. = $\frac{1}{4}$s. = 187s. 0d.
1$\frac{1}{2}$d. = $\frac{1}{2}$ of 3d. = 93 6
Va. at 4$\frac{1}{2}$d., 280 6
£14, 0s. 6d.

11.
4d. = $\frac{1}{3}$s. = 312s. 4d.
$\frac{3}{4}$d. = $\frac{1}{16}$ s. = 58 6$\frac{3}{4}$
Va. at 4$\frac{3}{4}$d., 370 10$\frac{3}{4}$
£18, 10s. 10$\frac{3}{4}$d.

12. 6d. = $\frac{1}{2}$s. = 428s. 6d.
—$\frac{3}{4}$ = $\frac{1}{8}$ of 6d. = 53 6$\frac{3}{4}$
Va. at 5$\frac{1}{4}$d., 374 11$\frac{1}{4}$
£18, 14s. 11$\frac{1}{4}$d.

13. 4d. = $\frac{1}{3}$s. = 195s. 4d.
1$\frac{1}{2}$d. = $\frac{1}{8}$s. = 73 3
Va. at 5$\frac{1}{2}$d., 268 7
£13, 8s. 7d.

14. 6d. = $\frac{1}{2}$s. = 374s. 0d.
—$\frac{1}{4}$d. = $\frac{1}{24}$ of 6d. = 15 7
Va. at 5$\frac{3}{4}$d., 358 5
£17, 18s. 5d.

15. 6d. = $\frac{1}{2}$s. = 463s. 0d.
$\frac{1}{4}$d. = $\frac{1}{24}$ of 6d. = 19 3$\frac{1}{2}$
Va. at 6$\frac{1}{4}$d., 482 3$\frac{1}{2}$
£24, 2s. 3$\frac{1}{2}$d.

16. 6d. = $\frac{1}{2}$s. = 256s. 0d.
$\frac{1}{2}$d. = $\frac{1}{12}$ of 6d. = 21 4
Va. at 6$\frac{1}{2}$d., 277 4
£13, 17s. 4d.

17. 6d. = $\frac{1}{2}$s. = 324s. 0d.
$\frac{3}{4}$d. = $\frac{1}{8}$ of 6d. = 40 6
Va. at 6$\frac{3}{4}$d., 364 6
£18, 4s. 6d.

18. 6d. = $\frac{1}{2}$s. = 478s. 6d.
1$\frac{1}{2}$d. = $\frac{1}{4}$ of 6d. = 119 7$\frac{1}{2}$
Va. at 7$\frac{1}{2}$d., 598 1$\frac{1}{2}$
£29, 18s. 1$\frac{1}{2}$d.

19. 6d. = $\frac{1}{2}$s. = 341s. 0d.
2d. = $\frac{1}{3}$ of 6d. = 113 8
$\frac{1}{4}$d. = $\frac{1}{8}$ of 2d. = 14 2$\frac{1}{2}$
Va. at 8$\frac{1}{4}$d., 468 10$\frac{1}{2}$
£23, 8s. 10$\frac{1}{2}$d.

20.
6d. = $\frac{1}{2}$s. = 371s. 0d.
3d. = $\frac{1}{2}$ of 6d. = 185 6
$\frac{1}{2}$d. = $\frac{1}{6}$ of 3d. = 30 11
Va. at 9$\frac{1}{2}$d., 587 5
£29, 7s. 5d.

21.
6d.= $\frac{1}{2}$s. = 421s. 0d.
4d.= $\frac{1}{3}$s. = 280 8
$\frac{1}{4}$d.=$\frac{1}{16}$of4d. = 17 6$\frac{1}{2}$
Va. at 10$\frac{1}{4}$d., 719 2$\frac{1}{2}$
£35, 19s. 2$\frac{1}{2}$d.

22. Va. at 1s. = 753s. 0d.
— 1d. = $\frac{1}{12}$s. = 62 9
Va. at 11d., 690 3
£34, 10s. 3d.

23. Va. at 1s. = 968s. 0d.
— $\frac{1}{4}$d. = $\frac{1}{48}$s. = 20 2
Va. at 11$\frac{3}{4}$d., 947 10
£47, 7s. 10d.

24. Va. at 1s. = 574s. 0d.
$\frac{1}{2}$d. = $\frac{1}{24}$s. = 23 11
Va. at 12$\frac{1}{2}$d., 597 11
£29, 17s. 11d.

25. Va. at 1s. = 597s. 0d.
1d. = $\frac{1}{12}$s. = 49 9
Va. at 13d., 646 9
£32, 6s. 9d.

26. Va. at 1s. = 279s. 0d.
2d. = $\frac{1}{6}$s. = 46 6
Va. at 14d., 325 6
£16, 5s. 6d.

27. 2s. = £$\frac{1}{10}$ = £52, 16s.
2d. = $\frac{1}{12}$ of 2s. = 4 8
Va. at 2s. 2d., £57, 4s.

28.
3s. 4d.=£$\frac{1}{6}$=£132, 10s. 0d.
5d.=$\frac{1}{8}$ of 3$\frac{1}{3}$s.= 16 11 3
Va. at 3s. 9d., £149, 1s. 3d.

29. 4s. = £$\frac{1}{5}$ = £134, 16s.
6d. = $\frac{1}{8}$ of 4s. = 16 17
Va. at 4s. 6d., £151, 13s.

30.
4s. = £$\frac{1}{5}$ = £165, 8s. 0d.
8d.=$\frac{1}{6}$of 4s.= 27 11 4
Va. at 4s. 8d., £192, 19s. 4d.

31.
5s. = £$\frac{1}{4}$ = £130, 15s. 0d.
1$\frac{1}{4}$s.=$\frac{1}{4}$of 5s.= 32 13 9
Va. at 6s. 3d., £163, 8s. 9d.

32.
5s. = £$\frac{1}{4}$ = £236, 15s. 0d.
2s. 6d.=£$\frac{1}{8}$= 118 7 6
Va. at 7s. 6d., £355, 2s. 6d.

33.
5s. = £$\frac{1}{4}$ = £62, 0s. 0d.
3s. 4d.= £$\frac{1}{6}$ = 41 6 8
Va. at 8s. 4d., £103, 6s. 8d.

34.
10s. = £$\frac{1}{2}$ = £239, 0s. 0d.
1$\frac{2}{3}$s.=$\frac{1}{6}$of 10s.= 39 16 8
Va. at 11s. 8d., £278, 16s. 8d.

35. 10s. = £$\frac{1}{2}$ = £288
2s. 6d. = $\frac{1}{4}$ of 10s. = 72
Va. at 12s. 6d., £360

36.
10s. = £$\frac{1}{2}$ = £473, 10s. 0d.
3s. 4d. = £$\frac{1}{6}$ = 157 16 8
Va. at 13s.4d., £631, 6s. 8d.

37.
10s. = £$\frac{1}{2}$ = £423, 10s. 0d.
6s.8d. = £$\frac{1}{3}$ = 282 6 8
Va. at 16s.8d., £705, 16s. 8d.

38. 2s. = £$\frac{1}{10}$ = £83, 8s.
8d. = $\frac{1}{3}$ of 2s. = 27 16
Va. at 2s. 8d., £111, 4s.

39. 10s. = £$\frac{1}{2}$ = £288
1s. 3d. = $\frac{1}{8}$ of 10s. = 36
Va. at 11s. 3d., £324

40.
10s. = £$\frac{1}{2}$ = £237, 10s. 0d.
—6d. = $\frac{1}{20}$ of 10s. = 11 17 6
Va. at 9s. 6d., £225, 12s. 6d.

41.
5s. = £$\frac{1}{4}$ = £187, 5s. 0d.
10d. = $\frac{1}{6}$ of 5s. = 31 4 2
$\frac{1}{2}$d. = $\frac{1}{20}$ of 10d. = 1 11 2$\frac{1}{2}$
V. at 5s.10$\frac{1}{2}$d., £220, 0s.4$\frac{1}{2}$d.

42. 10s. = £$\frac{1}{2}$ = £416, 0s.
2s.6d. = $\frac{1}{4}$ of 10s. = 104 0
1$\frac{1}{2}$d. = $\frac{1}{20}$ of 2s.6d. = 5 4
Va. at 12s. 7$\frac{1}{2}$d., £525, 4s.

43.
10s. = £$\frac{1}{2}$ = £484, 0s. 0d.
5s. = $\frac{1}{2}$ of 10s. = 242 0 0
4d. = $\frac{1}{15}$ of 5s. = 16 2 8
$\frac{1}{2}$d. = $\frac{1}{8}$ of 4d. = 2 0 4
Va. at 15s.4$\frac{1}{2}$d., £744, 3s. 0d.

44.
1s. 4d. = £$\frac{1}{15}$ = £50, 4s. 0d.
2s. = £$\frac{1}{10}$ = 75 6 0
6d. = $\frac{1}{4}$ of 2s. = 18 16 6
$\frac{3}{4}$d. = $\frac{1}{8}$ of 6d. = 2 7 0$\frac{3}{4}$
V. at 3s.10$\frac{3}{4}$d., £146, 13s. 6$\frac{3}{4}$d.

45.
10s. = £$\frac{1}{2}$ = £327, 0s.0d.
20d. = $\frac{1}{6}$ of 10s. = 54 10 0d.
—$\frac{1}{4}$d. = $\frac{1}{80}$ of 20d. = 0 13 7$\frac{1}{2}$
V. at 11s.7$\frac{3}{4}$d., £380, 16s.4$\frac{1}{2}$d.

46.
Va. at 18s. = 10674s. 0d.
6d. = $\frac{1}{2}$s. = 296 6
$\frac{1}{4}$d. = $\frac{1}{24}$ of 6d. = 12 4$\frac{1}{4}$
10982, 10$\frac{1}{4}$
V. at 18s.6$\frac{1}{4}$d., £549, 2s.10$\frac{1}{4}$d.

47. £567 v. at £1
— 6d. = £$\frac{1}{40}$ 14 3s. 6d.
—1$\frac{1}{2}$d. = $\frac{1}{4}$ of 6d. = 3 10 10$\frac{1}{2}$
Va. at 7$\frac{1}{2}$d., 17 14 4$\frac{1}{2}$
V. at 19s.4$\frac{1}{2}$d., £549, 5s.7$\frac{1}{2}$d.

48. Va. at £3 = £2508, 0s.
5s. = £$\frac{1}{4}$ = 209 0
2s.6d. = $\frac{1}{2}$ of 5s. = 104 10
Va. at 67s. 6d., £2821, 10s.

49.
Va. at £1 = £645, 0s. 0d.
4
〃 £4 = 2580 0 0
4s. = £$\frac{1}{5}$ = 129 0 0
4s. = £$\frac{1}{5}$ = 129 0 0
6d. = $\frac{1}{8}$ of 4s. = 16 2 6
1d. = $\frac{1}{6}$ of 6d. = 2 13 9
V. at 88s.7d., £2856, 16s. 3d.

50.

Va. at £1 =	£769,	0s.	0d.
			8
£8 =	6152	0	0
10s. = £$\frac{1}{2}$ =	384	10	0
1s. = $\frac{1}{10}$ of 10s. =	38	9	0
6d. = $\frac{1}{2}$ of 1s. =	19	4	6
V.at171s.6d.,	£6594,	3s.	6d.

51.

Va. at £2 =	£1906,	0s.	0d.
10s. = £$\frac{1}{2}$ =	476	10	0
—6d. = £$\frac{1}{40}$ =	23	16	6
V.at49s.6d.,	£2358,	13s.	6d.

52.

Va. at £4 =	£3144,	0s.
2s. = £$\frac{1}{10}$ =	78	12
8d. = $\frac{1}{3}$ of 2s. =	26	4
2d. = $\frac{1}{4}$ of 8d. =	6	11
Va. at 82s. 10d.,	£3255,	7s.

53.

Va. at £1 =	£735,	0s.
10s. = £$\frac{1}{2}$ =	367	10
1s.8d = $\frac{1}{6}$ of 10s. =	61	5
Va. at 31s. 8d.,	£1163,	15s.

54.

Va. at £2 =	£1172,	0s.	0d.
10s. = £$\frac{1}{2}$ =	293	0	0
6s.8d. = £$\frac{1}{3}$ =	195	6	8
8d. = $\frac{1}{10}$ of 6$\frac{2}{3}$s. =	19	10	8
V.at57s.4d.,	£1679,	17s.	4d.

55.

Va. at £5 =	£3185,	0s.	0d.
6s. 8d. = £$\frac{1}{3}$ =	212	6	8
V.at106s.8d.	£3397,	6s.	8d.

56.

Va. at £1 =	£496,	0s.	0d.
10s. = £$\frac{1}{2}$ =	248	0	0
4s. = £$\frac{1}{5}$ =	99	4	0
8d. = $\frac{1}{6}$ of 4s. =	16	10	8
Va. at 34s.8d.,	£859,	14s.	8d.

57.

Va. at £8 =	£4288,	0s.	0d.
6s. 8d. = £$\frac{1}{3}$ =	178	13	4
2s. = £$\frac{1}{10}$ =	53	12	0
V.at168s.8d.,	£4520,	5s.	4d.

58.

Va. at £20 =	£11440,	0s.
—2s. = £$\frac{1}{10}$ =	57	4
Va. at £19,18s.,	£11382,	16s.

59.

Va. at £23 =	£14996,	0s.
10s. = £$\frac{1}{2}$ =	326	0
4s. = £$\frac{1}{5}$ =	130	8
Va.at£23,14s.,	£15452,	8s.

60.

Va. at £9 =	£8802,	0s.	0d.
9s. = $\frac{1}{20}$ of £9 =	440	2	0
9d. = $\frac{1}{12}$ of 9s. =	36	13	6
V.at£9,9s.9d.,	£9278,	15s.	6d.

CASE III.

1. Value at 1 florin = £34, 16s.

2. Va. at 2s. = 957 fl.
3
Va. at 6s., £287, 2s.

3. Va. at 2s. = 583 fl.
4
Va. at 8s., £233, 4s.

4. Va. at 2s. = 975 fl.
7
Va. at 14s., £682, 10s.

5. Va. at 2s. = 685 fl.
11
Va. at 22s., £753,

6. Va. at 2s. = 754 fl.
19
Va. at 38s., £1432, 12s.

7. Va. at 1 fl. = 853 fl.
27
Va. at 54s., £2303, 2s.

8. Va. at 2s. = 976 fl.
3
2928
1s. = ½ fl. = 488
Va. at 7s., £341, 12s.

9. Va. at 2s. = 624 fl.
6
3744
1s. = ½ fl. = 312
Va. at 13s., £405, 12s.

10. Va. at 2s. = 956 fl.
8
7648
1s. = ½ fl. = 478
Va. at 17s., £812, 12s.

11. Va. at 2s. = 743 fl.
9
6687
1s. = ½ fl. = 371 1s.
Va. at 19s., £705, 17s.

12. Va. at 2s. = 675 fl.
13
8775
1s. = ½ fl. = 337 1s.
Va. at 27s., £911, 5s.

13. Va. at 2s. = 453 fl.
24
Va. at 48s., £1087, 4s.

14. Va. at 2s. = 595 fl.
32
Va. at 64s., £1904

15. Va. at 2s. = 586 fl.
26
15236
1s. = ½ fl. = 293
Va. at 53s., £1552, 18s.

16. Va. at 2s. = 759 fl.
49
37191
1s. = ½ fl. = 379 1s.
Va. at 99s., £3757, 1s.

17. Va. at 2s. = 576 fl.
18
10368
1s. = ½ fl. = 288
Va. at 37s., £1065, 12s.

18. Va. at 2s. = 633 fl.
57
36081
1s. = ½ fl. = 316 1s.
Va. at 115s., £3639, 15s.

19. Va. at 2s. = 698 fl.
25
17450
1s. = ½ fl. = 349
Va. at 51s., £1779, 18s.

20.
Va. at 2s. = 943 fl.
5
4715
6d. = $\frac{1}{4}$ fl. = 235 1s. 6d.
Va. at 10s. 6d., £495, 1s. 6d.

21.
Va. at 2s. = 247 fl.
24
5928
4d. = $\frac{1}{6}$ fl. = 41 0s. 4d.
V. at 48s. 4d., £596, 18s. 4d.

22.
Va. at 2s. = 453 fl.
17
7701
8d. = $\frac{1}{3}$ fl. = 151
V. at 34s. 8d., £785, 4s.

23.
Va. at 2s. = 657 fl.
3
1971
1s. = $\frac{1}{2}$ = 328 1s.
3d. = $\frac{1}{8}$ fl. = 82 0 3d.
Va. at 7s. 3d., £238, 3s. 3d.

24.
Va. at 2s. = 129 fl.
4
516
2d. = $\frac{1}{12}$ fl. = 10 1s. 6d.
Va. at 8s. 2d., £52, 13s. 6d.

25.
Va. at 2s. = 734 fl.
4
2936
1s. = $\frac{1}{2}$ fl. = 367
6d. = $\frac{1}{2}$s. = 183 1s.
3d. = $\frac{1}{4}$s. = 91 1 6d.
Va. at 9s. 9d., £357, 16s. 6d.

26.
Va. at 2s. = 678 fl.
2
1356
1s. = $\frac{1}{2}$ fl. = 339
8d. = $\frac{1}{3}$ fl. = 226
3d. = $\frac{1}{4}$s. = 84 1s. 6d.
V. at 5s. 11d., £200, 11s. 6d

27.
Va. at 2s. = 956 fl.
9
8604
6d. = $\frac{1}{4}$ fl. = 239
1d. = $\frac{1}{6}$ of 6d. = 39 1s. 8d.
V. at 18s. 7d., £888, 5s. 8d.

28.
Va. at 2s. = 631 fl.
44
27764
1s. = $\frac{1}{2}$ fl. = 315 1s.
4d. = $\frac{1}{3}$s. = 105 0 4d.
V. at 89s. 4d., £2818, 9s. 4d.

29.
Va. at 2s. = 593 fl.
34
20162
4d. = $\frac{1}{6}$ fl. = 98 1s. 8d.
1d. = $\frac{1}{4}$ of 4d. = 24 1 5
V. at 68s. 5d., £2028, 11s. 1d.

30.
Va. at 2s. = 672 fl.
19
12768
1s. = $\frac{1}{2}$ fl. = 336
8d. = $\frac{1}{3}$ fl. = 224
2d. = $\frac{1}{4}$ of 8d. = 56
V. at 39s. 10d., £1338, 8s.

CASE IV.

1.
Va. at 2s. = 678 fl.
14
9492
4d. = $\frac{1}{6}$ fl. = 113
$\frac{1}{2}$ cwt. = 7 0s. 2d.
678$\frac{1}{2}$ cwt. = £961, 4s. 2d.

2.
Va. at 2s. = 975 fl.
94
91650
$\frac{1}{3}$ cwt. = 31 0s. 8d.
975$\frac{1}{3}$ cwt. = £9168, 2s. 8d.

3.
Va. at 2s. = 756 fl.
8
6048
1s. = $\frac{1}{2}$ fl. = 378
6d. = $\frac{1}{2}$s. = 189
$\frac{1}{6}$ cwt. = 1 0s. 11d.
756$\frac{1}{6}$ cwt. = £661, 12s. 11d.

4.
Va. at 2s. = 579 fl.
44
25476
$\frac{1}{8}$ cwt. = 5 1s.
579$\frac{1}{8}$ cwt. = £2548, 3s.

5.
Va. at 2s. = 687 fl.
44
30228
6d. = $\frac{1}{4}$ fl. = 171 1s. 6d.
$\frac{1}{4}$ cwt. = 11 0 1$\frac{1}{2}$
687$\frac{1}{4}$ cwt. = £3041, 1s. 7$\frac{1}{2}$d.

6.
Va. at 2s. = 147 fl.
27
3969
4d. = $\frac{1}{6}$ fl. = 24 1s. 0d.
$\frac{1}{2}$ cwt. = 13 1 2
$\frac{1}{4}$ 〃 = 6 1 7
147$\frac{3}{4}$ cwt. = £401, 7s. 9d.

7.
Va. at 2s. = 218 fl.
174
37932
6d. = $\frac{1}{4}$ fl. 54, 1s. 0d.
$\frac{6}{12}$ or $\frac{1}{2}$ cwt. = 87 0 3
$\frac{1}{12}$ cwt. = 14 1 0$\frac{1}{2}$
218$\frac{7}{12}$ cwt. = £3808, 16s. 3$\frac{1}{2}$d.

8.
Va. at 2s. = 964 fl.
83
80012
1s. = $\frac{1}{2}$ fl. = 482
6d. = $\frac{1}{2}$s. = 241
$\frac{5}{15}$ or $\frac{1}{3}$ cwt. = 27 1s. 10d.
$\frac{3}{15}$ or $\frac{1}{5}$ 〃 = 16 1 6
964$\frac{8}{15}$ cwt. = £8077, 19s. 4d.

9.
Va. at 1s. = 964s. 0d.
15
14460 0
4d. = $\frac{1}{3}$s. = 321 4
$\frac{4}{8}$ or $\frac{1}{2}$ cwt. = 7 8
$\frac{1}{8}$ 〃 = 1 11
2,0)1479,0s. 11d.
964$\frac{5}{8}$ cwt. = £739, 10s. 11d.

10.

Va. at 2s. =	676 fl.			
	9			
	6084			
6d. = $\frac{1}{4}$ fl. =	169			
3d. = $\frac{1}{2}$ of 6d. =	84	1s.		
$\frac{1}{5}$ cwt. =	3	0	3d.	
$\frac{1}{5}$ 〃 =	3	0	3	
676$\frac{2}{5}$ cwt.,	£634,	7s.	6d.	

11.

Va. at 2s. =	754 fl.			
	9			
	6786			
6d. = $\frac{1}{4}$ fl. =	188,	1s.	0d.	
1d. = $\frac{1}{6}$ of 6d. =	31	0	10	
$\frac{3}{6}$ or $\frac{1}{2}$ cwt. =	4	1	3$\frac{1}{2}$	
$\frac{2}{6}$ or $\frac{1}{3}$ 〃 =	3	0	2$\frac{1}{4}$	$\frac{1}{3}$
754$\frac{5}{6}$ cwt.,	£701,	7s.	3$\frac{3}{4}$d.	$\frac{1}{3}$

12.

Va. at 2s. =	996 fl.			
	11			
	10956			
1s. = $\frac{1}{2}$ fl. =	498			
4d. = $\frac{1}{3}$s. =	166			
$\frac{4}{12}$ or $\frac{1}{3}$ cwt. =	3	1s.	9$\frac{1}{4}$d.	$\frac{1}{3}$
$\frac{1}{12}$ 〃 =		1	11$\frac{1}{4}$	$\frac{1}{3}$
996$\frac{5}{12}$ cwt.,	£1162,	9s.	8$\frac{1}{2}$d.	$\frac{2}{3}$

CASE V.

1.

1 cwt. =	£3,	18s.	6d.	
18 cwt. =	70	13	0	
2 qr. = $\frac{1}{2}$ cwt.	1	19	3	
1 qr. = $\frac{1}{2}$ of 2 qr.	0	19	7$\frac{1}{2}$	
4 lb. = $\frac{1}{7}$ qr.	0	2	9$\frac{1}{2}$	$\frac{4}{7}$
	£73,	14s.	8$\frac{0}{4}$d.	$\frac{4}{7}$

2.

20 cwt. =	£97,	13s.	4d.
2 qr. = $\frac{1}{2}$ cwt.	2	8	10
1 qr. = $\frac{1}{2}$ of 2 qr.	1	4	5
	£101,	6s.	7d.

3.

16 cwt. =	£42,	16s.	0d.	
14 lb. = $\frac{1}{8}$ cwt.	0	6	8$\frac{1}{4}$	
8 lb. = $\frac{1}{14}$ cwt.	0	3	9$\frac{3}{4}$	$\frac{3}{7}$
	£43,	6s.	6$\frac{0}{4}$d.	$\frac{3}{7}$

4.

	£	s.	d.	
15 cwt. =	68	16	3	
2 qr. = $\frac{1}{2}$ cwt.	2	5	10$\frac{1}{2}$	
1 qr. = $\frac{1}{2}$ of 2 qr.	1	2	11$\frac{1}{4}$	
14 lb. = $\frac{1}{2}$ qr.	0	11	5$\frac{1}{2}$	$\frac{7}{14}$
4 lb. = $\frac{1}{7}$ qr.	0	3	3$\frac{1}{4}$	$\frac{4}{14}$
	£72	19	9$\frac{1}{2}$	$\frac{11}{14}$

5.

	£	s.	d.	
6 cwt. =	17	15	6	
2 qr. = $\frac{1}{2}$ cwt.	1	9	7$\frac{1}{2}$	
7 lb. = $\frac{1}{8}$ of 2 qr.	0	3	8$\frac{1}{4}$	$\frac{3}{4}$
	£19	8	9$\frac{3}{4}$	$\frac{3}{4}$

6.

	£	s.	d.	
7 cwt. =	6	2	9$\frac{1}{2}$	
2 qr. = $\frac{1}{2}$ cwt.	0	8	9$\frac{1}{4}$	
1 qr. = $\frac{1}{2}$ of 2 qr.	0	4	4$\frac{1}{2}$	$\frac{14}{28}$
14 lb. = $\frac{1}{2}$ qr.	0	2	2$\frac{1}{4}$	$\frac{7}{28}$
4 lb. = $\frac{1}{7}$ qr.	0	0	7$\frac{1}{2}$	$\frac{2}{28}$
	£6	18	9$\frac{0}{4}$	$\frac{23}{28}$

7.

	£	s.	d.
72 cwt. =	278	8	0
2 qr. = $\frac{1}{2}$ cwt.	1	18	8
1 qr. = $\frac{1}{2}$ of 2 qr.	0	19	4
14 lb. = $\frac{1}{2}$ qr.	0	9	8
4 lb. = $\frac{1}{7}$ qr.	0	2	$9\frac{0}{4}\,\frac{4}{7}$
1 lb. = $\frac{1}{4}$ of 4 lb.	0	0	$8\frac{1}{4}\,\frac{1}{7}$
	£281	19	$1\frac{1}{4}\,\frac{5}{7}$

8. Va. at 2s. = 175 fl.

	9		
	1575		
8d. = $\frac{1}{3}$ fl. =	58	0s.	8d.
2 qr. = $\frac{1}{2}$ cwt.	4	1	4
1 qr. = $\frac{1}{2}$ of 2 qr.	2	0	8
14 lb. = $\frac{1}{2}$ qr.	1	0	4
8 lb. = $\frac{1}{7}$ of 2 qr.	0	1	4
	£164,	4s.	4d.

9.

16 cwt. =	£37,	10s.	8d.
2 qr. $\frac{1}{2}$ cwt.	1	3	$5\frac{1}{2}$
	£38,	14s.	$1\frac{1}{2}$d.

10.

	£	s.	d.
48 cwt. =	3591	12	0
2 qr. = $\frac{1}{2}$ cwt.	37	8	3
7 lb. = $\frac{1}{8}$ of 2 qr.	4	13	$6\frac{1}{4}\,\frac{1}{2}$
	£3633	13	$9\frac{1}{4}\,\frac{1}{2}$

11.

	£	s.	d.
16 lb. = $\frac{1}{7}$ cwt. =	0	13	$10\frac{1}{4}\,\frac{1}{7}$
8 lb. = $\frac{1}{2}$ of 16 lb.	0	6	$11\frac{0}{4}\,\frac{4}{7}$
	£1	0	$9\frac{1}{4}\,\frac{5}{7}$

12.

	£	s.	d.
16 lb. = $\frac{1}{7}$ cwt. =	0	9	4
1 lb. = $\frac{1}{16}$ of 16 lb.	0	0	7
	£0	9	11

13.

	£	s.	d.
480 cwt. =	160	0	0
2 qr. = $\frac{1}{2}$ cwt.	0	3	4
1 qr. = $\frac{1}{2}$ of 2 qr.	0	1	8
14 lb. = $\frac{1}{2}$ qr.	0	0	10
	£160	5	10

14.

Va. at 2s. = 774 fl.

	31		
	23994	0s.	0d.
6d. = $\frac{1}{4}$ fl. =	193	1	0
2 qr. = $\frac{1}{2}$ cwt.	15	1	3
8 lb. = $\frac{1}{7}$ of 2 qr.	2	0	$5\frac{1}{2}\,\frac{3}{7}$
	£2420,	10s.	$8\frac{1}{2}$d. $\frac{3}{7}$

15.

	£	s.	d.
10 cwt. =	14	15	0
8 lb. = $\frac{1}{14}$ cwt.	0	2	$1\frac{1}{4}\,\frac{1}{7}$
4 lb. = $\frac{1}{2}$ of 8 lb.	0	1	$0\frac{1}{2}\,\frac{4}{7}$
	£14	18	$1\frac{3}{4}\,\frac{5}{7}$

16.

	£	s.	d.
35 cwt. =	118	17	1
2 qr. = $\frac{1}{2}$ cwt.	1	13	$11\frac{1}{2}$
16 lb. = $\frac{1}{7}$ c.	0	9	$8\frac{1}{4}\,\frac{20}{35}$
8 lb. = $\frac{1}{2}$ of 16 lb.	0	4	$10\frac{0}{4}\,\frac{24}{35}$
1 lb. = $\frac{1}{8}$ of 8 lb.	0	0	$7\frac{1}{4}\,\frac{3}{35}$
	£121	6	$2\frac{1}{2}\,\frac{19}{35}$

17.

	£	s.	d.
4 lb. =	17	10	0
6 oz. = $\frac{1}{2}$ lb.	2	3	9
15 dt. = $\frac{1}{8}$ of 6 oz.	0	5	$5\frac{1}{2}\,\frac{1}{2}$
	£19	19	$2\frac{1}{2}\,\frac{1}{2}$

18.

	£	s.	d.
2 lb. =	7	5	0
24 dt. = $\frac{1}{10}$ lb.	0	7	3
18 gr. = $\frac{1}{32}$ of 24 dt.	0	0	$2\frac{1}{2}\,\frac{7}{8}$
	£7	12	$5\frac{1}{2}\,\frac{7}{8}$

19. £ s. d.
18 lb. = 76 1 0
30dwt. = $\frac{1}{8}$ lb. 0 10 $6\frac{3}{4}$
6dt.=$\frac{1}{5}$of 30dt. 0 2 $1\frac{1}{4}$ $\frac{96}{240}$
4gr.=$\frac{1}{36}$of 6dt. 0 0 $0\frac{1}{2}$ $\frac{196}{240}$
1g. = $\frac{1}{4}$ of 4 gr. 0 0 $0\frac{0}{4}$ $\frac{169}{240}$
£76 13 $8\frac{3}{4}$ $\frac{221}{240}$

20. 43 lb. = £19, 3s. 5d.
1 oz. = $\frac{1}{12}$ lb. 0 0 $8\frac{3}{4}$ $\frac{2}{3}$
£19, 2s. $8\frac{0}{4}$d $\frac{1}{3}$

21. £ s. d.
39 lb. = 218 8 0
6 oz. = $\frac{1}{2}$ lb. 2 16 0
4 oz. = $\frac{1}{3}$ lb. 1 17 4
12dt. = $\frac{1}{10}$ of 6 oz. 0 5 $7\frac{0}{4}$ $\frac{4}{5}$
1dt.=$\frac{1}{12}$of 12dt. 0 0 $5\frac{1}{2}$ $\frac{2}{5}$
12 g. = $\frac{1}{2}$ dt. 0 0 $2\frac{3}{4}$ $\frac{1}{5}$
£223 7 $7\frac{1}{2}$ $\frac{2}{5}$

22. Va. at 2s. = 86 fl.
48
4128
3 oz. = $\frac{1}{4}$ lb. 12
15 dt. = $\frac{1}{4}$ of 3 oz. 3
£414, 6s.

23.
Va. at 2s. = 54 fl.
36
1944
6 oz. = $\frac{1}{2}$lb. 18
$1\frac{1}{2}$oz.=$\frac{1}{4}$of 6oz. 4 1s.
6dt.=$\frac{1}{5}$of $1\frac{1}{2}$oz. 0 1 $9\frac{1}{2}$d.$\frac{2}{5}$
£196, 14s. $9\frac{1}{2}$d.$\frac{2}{5}$

24.
Va. at 2s. = 72 fl.
22
1584
6 oz. = $\frac{1}{2}$ lb. 11
4 oz. = $\frac{1}{3}$ lb. 7 0s. 8d.
$1\frac{1}{2}$ oz. = $\frac{1}{8}$ lb. 2 1 6
£160, 10s. 2d.

25. £ s. d.
65 lb. = 216 16 $0\frac{1}{3}$
6 oz. = $\frac{1}{2}$ lb. 1 13 $4\frac{1}{4}$
4 oz. = $\frac{1}{3}$ lb. 1 2 $2\frac{3}{4}$ $\frac{20}{60}$
12 dt. = $\frac{1}{10}$ of 6oz. 0 3 $4\frac{0}{4}$ $\frac{6}{60}$
2 dt. = $\frac{1}{6}$ of 12dt. 0 0 $6\frac{1}{2}$ $\frac{41}{60}$
£219 15 $6\frac{1}{4}$ $\frac{7}{60}$

26. £ s. d.
56 lb. = 233 6 8
4 oz. = $\frac{1}{3}$ lb. 1 7 $9\frac{1}{4}$ $\frac{4}{12}$
1 oz. = $\frac{1}{4}$ of 4 oz. 0 6 $11\frac{1}{4}$ $\frac{4}{12}$
10 dt. = $\frac{1}{2}$ oz. 0 3 $5\frac{1}{2}$ $\frac{8}{12}$
5dt. = $\frac{1}{2}$ of 10 dt. 0 1 $8\frac{3}{4}$ $\frac{4}{12}$
15 g. = $\frac{1}{8}$ of 5 dt. 0 0 $2\frac{1}{2}$ $\frac{5}{12}$
3 g. = $\frac{1}{5}$ of 15 g. 0 0 $0\frac{1}{2}$ $\frac{1}{12}$
£235 6 $10\frac{1}{4}$ $\frac{1}{3}$

27.
Va. 2s. = 468 fl.
26
12168
2po.=$\frac{1}{80}$ml. 0 0s. $7\frac{3}{4}$d.$\frac{1}{5}$
£1216, 15s. $4\frac{0}{4}$d.$\frac{4}{5}$

28. £ s. d.
96 ac. = 376 16 0
2 ro. = $\frac{1}{2}$ ac. 1 19 3
20 pe. = $\frac{1}{4}$ of 2 r. 0 9 $9\frac{3}{4}$
4 pe. = $\frac{1}{5}$ of 20 po. 0 1 $11\frac{1}{2}$ $\frac{1}{5}$
£379 7 $0\frac{1}{4}$ $\frac{1}{5}$

29.

	£	s.	d.
12 ac. =	11	7	0
2 ro. = ½ ac.	0	9	5½
1 ro. = ½ of 2 r.	0	4	8¾
20 pe. = ½ ro.	0	2	4¼ ½
	£12	3	6½ ½

30.

	£	s.	d.
15 ac. =	14	12	6
2 ro. = ½ ac.	0	9	9
16 pe. = ⅕ of 2 r.	0	1	11¼ $\frac{6}{10}$
2 pe. = ⅛ of 16 p.	0	0	2¾ $\frac{7}{10}$
	£15	4	5¼ $\frac{3}{10}$

31.

Va. at 2s. = 424 fl.
3
1272
8d. = ⅓ fl. 141 0s. 8d.
½d. = $\frac{1}{16}$ of 8d. 8 1 8
6 in. = ½ ft. 1 1 4½
1 in. = ⅙ of 6 in. 0 0 6½ ⅚
£142, 8s. 2¾d. ⅚

32. 96 feet = £36, 0s. 0d.
6 in. = ½ ft. 0 3 9
4 in. = ⅓ ft. 0 2 6
£36, 6s. 3d.

33.

Va. at 2s. = 465 fl.
2
930
6d. = ¼ fl. 116 0s. 6d.
6 in. = ½ in. 1 0 3
£104, 14s. 9d.

34.

Va. at 1s. = 167s. 0d.
5
835 0
6d. = ½s. 83 6
1d. = ⅙ of 6d. 13 11
3 in. = ¼ ft. 1 4¾
933s. 9¾d.
£46, 13s. 9¾d.

35.

Va. at 2s. = 878 fl.
8
7024
8d. = ⅓ fl. 292 1s. 4d.
6 in. = ½ ft. 4 0 4
3 in. = ¼ ft. 2 0 2
£732, 5s. 10d.

EXERCISES UNDER THE NOTES.

1. Va. at 2s. = 57 fl.
14
£79, 16s.

2. Va. at 2s. = 79 fl.
16
£126, 8s.

3. Va. at 2s. = 94 fl.
8
£75, 4s.

4. Va. at 2s. = 37 fl.
24
£88, 16s.

5. Va. at 2s. = 19 fl.
9
£17, 2s.

6. Va. at £1 = £29
12
£348

7. Va. at £1 = £43
24
£1032

8. Va. at £1 = £98
120
£11760

9. Va. at £1 = £137
960
£131520

---

10. £0, 9s. 4d.
7
£3, 5s. 4d.

11. £0, 9s. 4d.
9$\frac{1}{2}$
4 4 0
0 4 8
£4, 8s. 8d.

12. Va. at 1s. = £5, 12s.
$\frac{3}{4}$d. = $\frac{1}{16}$s. 7
£5, 5s.

13. £0, 9s. 4d.
5$\frac{3}{4}$
2 6 8
0 7 0
£2, 13s. 8d.

14. £0, 9s. 4d.
4$\frac{1}{4}$
1 17 4
0 2 4
1 19 8
3
£5, 19s. 0d.

15. £0, 9s. 4d.
9$\frac{3}{4}$
4 4 0
0 7 0
4 11 0
7
£31, 17s. 0d.

16.
Va. at 1s. = £5, 12s. 0d.
2d. = $\frac{1}{6}$s. 0 18 8
$\frac{1}{2}$d. = $\frac{1}{4}$ of 2d. 0 4 8
6 15 4
6
£40, 12s. 0d.

17. Va. at 1s. = £5, 12s. 0d.
1d. = $\frac{1}{12}$s. 0 9 4
$\frac{3}{4}$d. = $\frac{1}{16}$s. 0 7 0
6 8 4
11
£70, 11s. 8d.

18.
£0, 9s. 4d.
$10\frac{1}{4}$
4 13 4
0 2 4
4 15 8
12
£57, 8s. 0d.

19.
£0, 9s. 4d.
$11\frac{1}{2}$
5 2 8
0 4 8
5 7 4
14
£75, 2s. 8d.

PROMISCUOUS EXERCISES.

1. Va. at 1s. = 7846s.
$\frac{1}{2}$d. = $\frac{1}{24}$s. 326 11d.
2,0)751,9 1
£375, 19s. 1d.

2. Va. at 2s. = 8974 fl.
43
£38588, 4s.

3.
Va. at £1 = £8345, 0s. 0d.
1d. = £$\frac{1}{240}$ 34 15 5
£8310, 4s. 7d.

4. Va. at £1 = £6748
2s. 6d. = £$\frac{1}{8}$, £843, 10s.

5.
Va. at 2s. = 9674 fl.
7
67718
8d. = $\frac{1}{3}$ fl. 3224 1s. 4d.
2d. = $\frac{1}{12}$ fl. 806 0 4
£7174, 17s. 8d.

6.
Va. at 2s. = 8341 fl.
46
383686
8d. = $\frac{1}{3}$ fl. 2780 0 8
$\frac{1}{2}$d. = $\frac{1}{16}$ of 8d. 173 1 $6\frac{1}{2}$d.
£38664, 0s. $2\frac{1}{2}$d.

7.
Va. at 2s. = 6834 fl.
39
266526
1d. = $\frac{1}{24}$ fl. 284 1s. 6d.
£26624, 2s. 6d.

8. Va. at 2s. = 648 fl.
65
42120
1s. = $\frac{1}{2}$ fl. 324
£4244, 8s.

9.
Va. at 2s. = 674 fl.
$9\frac{1}{2}$—$\frac{3}{4}$d.
6066
1s. = $\frac{1}{2}$ fl. 337
6403
$\frac{3}{4}$d. = $\frac{1}{16}$s. 21 0s. $1\frac{1}{2}$d.
£638, 3s. $10\frac{1}{2}$d.

10.
Va. at 2s. = 8341 fl.
6d. = $\frac{1}{4}$ fl. 2085 0s. 6d.
2d. = $\frac{1}{3}$ of 6d. 695 0 2
$\frac{3}{4}$d. = $\frac{1}{8}$ of 6d. 260 1 $3\frac{3}{4}$
£304, 1s. $11\frac{3}{4}$d.

11.
Va. at £1 = £6874 0s.
10s. = £$\frac{1}{2}$ 3437 0
5s. = $\frac{1}{2}$ of 10s. 1718 10
6d. = $\frac{1}{10}$ of 5s. 171 17
£5327, 7s.

12.
10s. = £$\frac{1}{2}$ = £4573, 0s. 0d.
5s. = $\frac{1}{2}$ of 10s. 2286 10 0
6d. = $\frac{1}{10}$ of 5s. 228 13 0
$\frac{1}{2}$d. = $\frac{1}{12}$ of 6d. 19 1 1
$\frac{1}{8}$ bush. = 0 5 2$\frac{1}{8}$
£7107, 9s. 3$\frac{1}{8}$d.

13.
10s. = £$\frac{1}{2}$ = £1959 0s.
2s. 6d. = £$\frac{1}{8}$ 489 15
£2448, 15s.

14.
1s. = £$\frac{1}{20}$ = £13, 12s. 0d.
2d. = $\frac{1}{6}$s. 2 5 4
$\frac{4}{12}$d. = $\frac{1}{6}$ of 2d. 0 7 6$\frac{1}{2}$ $\frac{2}{3}$
$\frac{1}{12}$d. = $\frac{1}{4}$ of $\frac{4}{12}$d. 0 1 10$\frac{1}{2}$ $\frac{2}{3}$
£16, 6s. 9$\frac{1}{4}$d. $\frac{1}{3}$

15.
oz. dwt.
4 dwt. = $\frac{1}{5}$ oz. = 1751314 8
1 dt. = $\frac{1}{4}$ of 4 dt. 437828 12
3 gr. = $\frac{1}{8}$ dwt. 54728 11$\frac{1}{2}$
$\frac{3}{11}$ gr. = $\frac{1}{11}$ of 3gr. 4975 6$\frac{1}{2}$
12)2248846 oz. 18 dwt.
187403 lb. 10 oz. 18 dwt.

16.
6d. = £$\frac{1}{40}$ = £14, 8s. 5$\frac{1}{2}$d.
1$\frac{1}{2}$d. = $\frac{1}{4}$ of 6d. 3 12 1$\frac{1}{4}$ $\frac{1}{2}$
£18, 0s. 6$\frac{3}{4}$d. $\frac{1}{2}$

17.
Va. at 2s. = 346 fl.
56
19376
16 lb. = $\frac{1}{7}$ cwt. 49 0s. 10$\frac{1}{4}$d. $\frac{1}{7}$
2lb. = $\frac{1}{8}$ of 16lb. 6 0 4$\frac{1}{4}$ $\frac{1}{7}$
£1943, 3s. 2$\frac{1}{2}$d. $\frac{2}{7}$

18.
37 cwt. = £125, 16s. 0d.
16 lb. = $\frac{1}{7}$ cwt. 0 9 8$\frac{1}{2}$ $\frac{2}{7}$
4lb. = $\frac{1}{4}$ of 16lb. 0 2 5$\frac{0}{4}$ $\frac{4}{7}$
8 oz. = $\frac{1}{8}$ of 4 lb. 0 0 3$\frac{1}{2}$ $\frac{4}{7}$
4 oz. = $\frac{1}{2}$ of 8 oz. 0 0 1$\frac{3}{4}$ $\frac{2}{7}$
£126, 8s. 7$\frac{0}{4}$d. $\frac{5}{7}$

19. 4 lb. = £18, 10s. 0d.
10 dt. = $\frac{1}{24}$ lb. 0 3 10$\frac{1}{4}$
£18, 6s. 1$\frac{3}{4}$d.

20.
£ s. d.
86 lb. = 414 4 8
3 oz. = $\frac{1}{4}$ lb. 1 4 1
15 dt. = $\frac{1}{4}$ of 3oz. 0 6 0$\frac{1}{4}$
18 gr. = $\frac{1}{20}$ 0 0 3$\frac{1}{2}$ $\frac{9}{20}$
of 15 dt.,] £415 15 0$\frac{3}{4}$ $\frac{9}{20}$

21. Va. at 2s. = 145 fl.
183
26535 s. d.
2 ro. = $\frac{1}{2}$ ac. 91 1 0
1 ro. = $\frac{1}{2}$ of 2 ro. 45 1 6
10 pe. = $\frac{1}{4}$ ro. 11 0 10$\frac{1}{2}$
5 pe. = $\frac{1}{2}$ of 10 p. 5 1 5$\frac{1}{4}$
£2668 18 9$\frac{3}{4}$

22.
£ s. d.
95 ac. = 3589 8 4
2 ro. = $\frac{1}{2}$ ac. 18 17 10
16 pe. = $\frac{1}{5}$ of 2 r. 3 15 6$\frac{3}{4}$ $\frac{1}{5}$
2 pe. = $\frac{1}{8}$ of 16 p. 0 9 5$\frac{1}{4}$ $\frac{2}{5}$
£3612 11 2$\frac{0}{4}$ $\frac{3}{5}$

23.

	£	s.	d.
4571 yd. =	4332	18	$6\frac{1}{2}$
$\frac{3}{6}$ or $\frac{1}{2}$ yd. =	0	9	$5\frac{3}{4}$
$\frac{2}{6}$ or $\frac{1}{3}$ yd. =	0	6	$3\frac{3}{4}$ $\frac{1}{3}$
	£4333	14	$4\frac{0}{4}$ $\frac{1}{3}$

24.

	£	s.	d.
10s. = £$\frac{1}{2}$ =	2835	8	4
5s. = $\frac{1}{2}$ of 10s.	1417	14	2
2s.6d. = $\frac{1}{2}$ of 5s.	708	17	1
	£4961	19	7

BILLS OF PARCELS.

1. £5, 9s. 4d.
4 9 10
10 7 $7\frac{1}{2}$
9 11 0
1 18 3
20 13 4
£52, 9s. $4\frac{1}{2}$d.

2. £2, 2s. 9d.
1 3 11
5 10 8
3 8 0
2 0 6
2 7 3
£16, 13s. 1d.

3. £5, 5s. 9d.
6 13 2
19 19 0
11 12 11
19 18 9
1 13 3
£65, 2s. 10d.

4. £24, 1s. 3d.
20 14 2
28 10 $6\frac{3}{4}$
7 1 10
2 1 $7\frac{1}{2}$
6 2 $3\frac{3}{4}$ $\frac{1}{4}$
£88, 11s. $9\frac{0}{4}$d. $\frac{1}{4}$

5. £56, 2s. 0d.
31 1 0
15 4 0
100 15 0
17 4 0
19 11 6
6 2 6
£246, 0s. 0d.

6. £39, 12s. 0d.
72 10 0
128 12 6
33 15 0
19 12 0
47 5 0
19 8 8
£360, 15s. 2d.

7. £140, 0s. 0d.
105 17 6
85 6 3
44 3 4
55 19 $6\frac{1}{4}$
11 9 2
19 17 6
£462, 13s. $3\frac{1}{4}$d.

8. £44, 11s. 1d.
99 10 $7\frac{1}{2}$
63 8 $5\frac{1}{4}$
359 0 $4\frac{1}{2}$
70 8 4
142 16 0
206 12 $8\frac{1}{4}$
£986, 7s. $6\frac{1}{2}$d.

9. £16, 1s. $9\frac{3}{4}$d.
25 14 $8\frac{1}{4}$
42 11 $8\frac{1}{2}$ $\frac{1}{2}$
14 15 $11\frac{0}{4}$ $\frac{1}{4}$
111 0 $7\frac{1}{2}$
9 9 0
23 10 $3\frac{3}{4}$
86 11 4
£329, 15s. $4\frac{3}{4}$d. $\frac{3}{4}$

10. £75, 1s. $0\frac{1}{2}$d.
88 2 2
521 12 6
255 1 3
364 19 2
307 2 11
180 7 6
169 6 3
£1961, 12s. $9\frac{1}{2}$d.

11. £175, 1s. $1\frac{1}{2}$d.
167 15 $1\frac{1}{2}$
158 3 $7\frac{3}{4}$
197 10 $7\frac{1}{2}$
237 17 1
195 12 $1\frac{3}{4}$
191 0 $9\frac{1}{2}$
384 15 $10\frac{1}{2}$
£1707, 16s. 5d.

12.

£94,	8s.	3¾d.	
20	6	3	
139	4	4½	
215	9	3¼	5/7
60	0	11¼	
143	18	9	
238	19	0	
5	19	0	
7	12	0	
40	2	1	
£965,	19s.	11¾d.	5/7

13.

£668,	10s.	0d.	
440	4	3	
56	13	0¼	5/7
192	5	10	
153	2	6	
46	11	7¾	
27	15	9	
379	11	7¼	3/7
20	11	10	
3	2	10¼	3/7
£1988,	9s.	3¾d.	4/7

14.

£62,	3s.	10½d.	
30	3	9½	34/49
10	17	1¼	16/49
105	16	0¼	12/49
632	11	6½	6/49
632	6	0½	
47	5	8½	14/49
257	5	0	
11	10	0	
32	10	0	
£1822,	9s.	1¼d.	33/49

DECIMAL FRACTIONS.

ADDITION AND SUBTRACTION OF FINITE DECIMALS.

1.
478·63
89·005
5437·25
0·000125
91·75
541·2375
6637·872625

2.
6·75
89·5
0·00009
0·502
7·548
2178·
2282·30009

3.
51·416
915·13
·04751
·005819
·000045
·01018
966·609554

4.
74·874
81·33486
·0974
1·0718
88·71034
246·0884

5.
61·371568
·0091
·06371
·0008714
43·814
105·2592494

6.
75·67
125·
·00725
67·
19·25
37·
2145·0007
2468·92795

7.
71·48
35·71
35·77

87·31
6·871496
80·438504

3·187
1·00007
2·18693

·6748
·377
·2978

1·000009
·784163
0·215846

4·001
·374
3·627

7. ·00078
·000089
·000691

75·
·0057
74·9943

67·525
5·0075
62 5175

MULTIPLICATION OF FINITE DECIMALS.

1. 74869·3
·673
2246079
5240851
4492158
50387·0389

2. 8914·714
6·7
62402998
53488284
59728·5838

3. 71·807
·0009
·0646263

4. ·0714
·013
·0009282

5. 91·07
·03
2·7321

6. 58·62
·3
17·586

7. 74·58
·083
22374
59664
6·19014

8. ·987
·642
1974
3948
5922
·633654

9. ·078
·004
·000312

10. 478
·038
3824
1434
18·164

11. 748
·6
448·8

11. 748
·0075
3740
5236
5·6100

12. 891
·72
1782
6237
641·52

891
1·025
4455
1782
8910
913·275

13. 781·4

7814

14. 9851·6

15. 6871460

DIVISION OF FINITE DECIMALS.

1. 1100)14641·00
13·31

19360)14641·00000
·75625

2. 8204)5040·20944
·61436

64)504·02094400
7·87532725

3. 2315)183688·305
79·347

25)1836883·05
73475·322

4. 53146)22118605·212$\dot{2}$
416·1857

5. 1548)4888·501956
3·157947

6. 8416591)30266·061236
·003596

7. 25)78468950
3138758

8. 75)8748612·50
116648·16$\frac{2}{3}$

9. 785)87416·850
111·359$\frac{7}{157}$

10. 3385)3741655·600000
1105·363545$\frac{35}{677}$

11. 785)18000·0000000
22·9299363$\frac{9}{157}$

45)1800000
·40000

12. 1000)7486·35
7·48635

13. 17·9435—4·9646 = 12·9789×4·62 = 59·962518÷ ·363 = 165·186

REDUCTION OF FINITE DECIMALS.

PROBLEM I.

1. 8)5·000
$\frac{5}{8}$ = ·625

2. 2)1·0
$\frac{1}{2}$ = ·5

3. 4)1·00
$\frac{1}{4}$ = ·25

4. 4)3·00
$\frac{3}{4}$ = ·75

5. 8)7·000
$\frac{7}{8}$ = ·875

6. 3)1·0
$\frac{1}{3}$ = ·$\dot{3}$

7. 9)1·0
$\frac{1}{9}$ = ·$\dot{1}$

8. 6)5·00
$\frac{5}{6}$ = ·8$\dot{3}$

9. 6)1·00
$\frac{1}{6}$ = ·1$\dot{6}$

10. $16\,)\,\underline{9\cdot0000}$
$\frac{9}{16} = \cdot5625$

11. $5\,)\,\underline{1\cdot0}$
$\frac{1}{5} = \cdot2$

12. $75\,)\,\underline{1\cdot00}$
$\frac{1}{75} = \cdot01\dot{3}$

13. $1875\,)\,\underline{1\cdot00000}$
$\frac{1}{1875} = \cdot0005\dot{3}$

14. $11\,)\,\underline{7\cdot00}$
$\frac{7}{11} = \cdot\dot{6}\dot{3}$

15. $11\,)\,\underline{8\cdot00}$
$\frac{8}{11} = \cdot\dot{7}\dot{2}$

16. $9\,)\,\underline{4\cdot0}$
$\frac{4}{9} = \cdot\dot{4}$

17. $11\,)\,\underline{9\cdot00}$
$\frac{9}{11} = \cdot\dot{8}\dot{1}$

18. $7\,)\,\underline{1\cdot000000}$
$\frac{1}{7} = \cdot\dot{1}4285\dot{7}$

19. $11\,)\,\underline{3\cdot00}$
$\frac{3}{11} = \cdot\dot{2}\dot{7}$

20. $13\,)\,\underline{1\cdot000000}$
$\frac{1}{13} = \cdot\dot{0}7692\dot{3}$

21. $99\,)\,\underline{1\cdot00}$
$\frac{1}{99} = \cdot\dot{0}\dot{1}$

22. $54\,)\,\underline{11\cdot0000}$
$\frac{11}{54} = \cdot2\dot{0}3\dot{7}$

23. $3\,)\,\underline{2\cdot0}$
$\frac{2}{3} = \cdot\dot{6}$

24. $17\,)\,\underline{16\cdot0000000000000000}$
$\frac{16}{17} = \cdot\dot{9}41176470588235\dot{2}$

PROBLEM II.

1. $\cdot5 = \frac{5}{10} = \frac{1}{2}$
2. $\cdot25 = \frac{25}{100} = \frac{1}{4}$
3. $\cdot75 = \frac{75}{100} = \frac{3}{4}$
4. $\cdot125 = \frac{125}{1000} = \frac{1}{8}$
5. $\cdot625 = \frac{625}{1000} = \frac{5}{8}$
6. $\cdot34 = \frac{34}{100} = \frac{17}{50}$
7. $\cdot375 = \frac{375}{1000} = \frac{3}{8}$
8. $\cdot005 = \frac{5}{1000} = \frac{1}{200}$
9. $\cdot078 = \frac{78}{1000} = \frac{39}{500}$
10. $\cdot15625 = \frac{15625}{100000} = \frac{5}{32}$
11. $\cdot03125 = \frac{3125}{100000} = \frac{1}{32}$
12. $\cdot01875 = \frac{1875}{100000} = \frac{3}{160}$
13. $3\cdot24 = 3\frac{24}{100} = 3\frac{6}{25}$
14. $5\cdot128 = 5\frac{128}{1000} = 5\frac{16}{125}$
15. $7\cdot512 = 7\frac{512}{1000} = 7\frac{64}{125}$
16. $6\cdot075 = 6\frac{75}{1000} = 6\frac{3}{40}$
17. $\cdot00525 = \frac{525}{100000} = \frac{21}{4000}$
18. $\cdot015625 = \frac{15625}{1000000} = \frac{1}{64}$
19. $\cdot078125 = \frac{78125}{1000000} = \frac{5}{64}$
20. $\cdot006225 = \frac{6225}{1000000} = \frac{249}{40000}$

PROBLEM III.

1. $£\frac{9}{240} = £{\cdot}0375$
2. $£\frac{10}{240} = £{\cdot}041\dot{6}$
3. $£\frac{7}{8} = £{\cdot}875$
4. $£\frac{203}{320} = £{\cdot}634375$
5. $£\frac{959}{960} = £{\cdot}998958\dot{3}$
6. $£\frac{343}{480} = £{\cdot}71458\dot{3}$
7. $£\frac{1}{6} = £{\cdot}1\dot{6}$
8. $£\frac{1}{3} = £{\cdot}\dot{3}$
9. $£\frac{2}{3} = £{\cdot}\dot{6}$
10. $£\frac{11}{240} = £{\cdot}0458\dot{3}$
11. $£\frac{3}{160} = £{\cdot}01875$
12. $£\frac{1}{320} = £{\cdot}003125$
13. $\frac{1}{16}$ cwt. $=$ ·0625 cwt.
14. $\frac{1}{14}$ cwt. $= {\cdot}0\dot{7}1428\dot{5}$ cwt.
15. $\frac{17}{2240}$ to. $= {\cdot}007589\frac{2}{7}$ to.
16. $\frac{2029}{2240}$ to. $= {\cdot}905803\frac{4}{7}$ to.
17. $\frac{79}{80}$ lb. $=$ ·9875 lb. tr.
18. $\frac{41}{720}$ lb. $= {\cdot}0569\dot{4}$ lb. tr.
19. $\frac{11}{40}$ oz. $=$ ·275 oz. tr.
20. $\frac{9}{2048}$ ct. $= {\cdot}00439453\frac{1}{8}$ ct.
21. $\frac{43}{64}$ lb. $=$ ·671875 lb. av.
22. $\frac{223}{720}$ lb. $= {\cdot}3097\dot{2}$ lb. tr.
23. $\frac{3}{4}$ yd. $=$ ·75 yd.
24. $\frac{3}{8}$ yd. $=$ ·375 yd.
25. $\frac{49}{64}$ ml. $=$ ·765625 ml.
26. $\frac{91}{160}$ ac. $=$ ·56875 ac.
27. $\frac{8}{9}$ ft. $= {\cdot}\dot{8}$ ft.
28. $\frac{11}{12}$s. $= {\cdot}91\dot{6}$s.
29. $\frac{5}{6}$s. $= {\cdot}8\dot{3}$s.
30. $\frac{5}{8}$s. $=$ ·625s.
31. $\frac{85}{144}$ gu. $= {\cdot}5902\dot{7}$ gu.
32. $\frac{157}{256}$ qr. $= {\cdot}61328\frac{1}{8}$ qr.
33. $\frac{215}{198}$ po. $= 1{\cdot}0\dot{8}\dot{5}$ po.
34. $\frac{29}{1460}$ ye. $= {\cdot}019863\frac{1}{73}$ ye.
35. $\frac{143}{480}$ da. $= {\cdot}29791\dot{6}$ da.
36. $\frac{147}{400}$ ho. $=$ ·3675 ho.
37. $\frac{31}{80}$ ac. $=$ ·3875 ac.
38. $\frac{613}{4840}$ ac. $=$ ·126652+ac.
39. $\frac{83}{5445}$ ro. $=$ ·015243+ro.
40. $\frac{7}{730}$ ye. $= {\cdot}009589\frac{3}{73}$ ye

PROBLEM IV.

1\.
$£{\cdot}0375$
$\overline{{\cdot}7500}$s.
$9{\cdot}\overline{0000}$d.

2\.
$£{\cdot}0416$
$\overline{{\cdot}832}$s.
$9{\cdot}\overline{984}$d.
$3{\cdot}\overline{936}$ qr.

3\.
$£{\cdot}875$
$17{\cdot}\overline{500}$s.
$6{\cdot}\overline{000}$d.

4\.
$£{\cdot}634375$
$12{\cdot}\overline{687500}$s.
$8{\cdot}\overline{250000}$d.
$1{\cdot}\overline{000000}$ qr.

5\.
$£{\cdot}9989583$
$19{\cdot}\overline{979166}$s.
$11{\cdot}\overline{749992}$d.
$2{\cdot}\overline{999968}$ qr.

6\.
$£{\cdot}714583$
$14{\cdot}\overline{291660}$s.
$3{\cdot}\overline{499920}$d.
$1{\cdot}\overline{999680}$ qr.

7. £·16
3·$\overline{20}$s.
2·$\overline{40}$d.
1·$\overline{60}$ qr.

8. £·3
6·$\overline{0}$s.

9. £·6
12·$\overline{0}$s.

10. ·9166s.
10·$\overline{9992}$d.
3·$\overline{9968}$ qr.

11. ·375s.
4·$\overline{500}$d.
2·$\overline{000}$ qr.

12. ·0625s.
·$\overline{7500}$d.
3·$\overline{0000}$ qr.

13. ·0625 cwt.
7·$\overline{000}$ lb.

14. ·071428 cwt.
7·$\overline{999936}$ lb.

15. ·007589 ton.
16·$\overline{999360}$ lb.

16. 18·116 cwt.
12·$\overline{992}$ lb.
15·$\overline{872}$ oz.

17. 11·85 oz.
17·$\overline{00}$ dwt.

18. ·68328 oz.
13·$\overline{66560}$ dwt.
15·$\overline{97440}$ grs.

19. ·275 oz.
5·$\overline{500}$ dwt.
12·$\overline{000}$ gr.

20. ·492128 lb.
7·$\overline{874048}$ oz.
13·$\overline{984768}$ drs.

21. 10·75 oz.
12·$\overline{00}$ drs.

22. 3·71664 oz.
14·$\overline{33280}$ dwt.
7·$\overline{98720}$ grs.

23. ·75 yd.
3·$\overline{00}$ qr.

24. ·375 yd.
1·$\overline{500}$ qr.
2·$\overline{000}$ nl.

25. 6·125 fu.
5·$\overline{000}$ pol.

26. 2·275 ro.
11·$\overline{000}$ per.

27. ·8 ft.
9·$\overline{6}$ in.

28. ·916s.
10·$\overline{992}$d.
3·$\overline{968}$ qr.

29. $9\cdot96$d.
$3\cdot\overline{84}$ qr.

30. $7\cdot5$d.
$2\cdot\overline{0}$ qr.

31. $12\cdot39567$s.
$4\cdot\overline{74804}$d.
$2\cdot\overline{99216}$ qr.

32. $\cdot61328125$ qr.
$4\cdot\overline{90625000}$ bu.
$3\cdot\overline{62500000}$ pk.
$1\cdot\overline{25000000}$ ga.

33. $5\cdot9675$ yd.
$2\cdot\overline{9025}$ ft.
$10\cdot\overline{8300}$ in.

34. $7\cdot249995$ days
$5\cdot\overline{999880}$ ho.

35. $7\cdot1496$ ho.
$8\cdot\overline{9760}$ min.
$58\cdot\overline{5600}$ sec.

36. $22\cdot05$ min.
$3\cdot\overline{00}$ sec.

CONTRACTIONS IN DECIMALS.

CONTRACTION 1.

1.
$$\begin{array}{r} \cdot8740 \\ 573\cdot0 \\ \hline 2622 \\ 612 \\ 44 \\ \hline \cdot3278 \end{array}$$

2.
$$\begin{array}{r} \cdot879 \\ 12\cdot4 \\ \hline 3516 \\ 176 \\ 9 \\ \hline 3\cdot701 \end{array}$$

3.
$$\begin{array}{r} 6\cdot7140 \\ 8764\cdot0 \\ \hline 26856 \\ 4028 \\ 470 \\ 54 \\ \hline 3\cdot1408 \end{array}$$

4.
$$\begin{array}{r} 4\cdot87520 \\ 978\cdot6 \\ \hline 2925120 \\ 390016 \\ 34126 \\ 4388 \\ \hline 33\cdot53650 \end{array}$$

5.
$$\begin{array}{r} 71\cdot856300 \\ 52700\cdot0 \\ \hline 502994 \\ 14371 \\ 3593 \\ \hline \cdot520958 \end{array}$$

6.
$$\begin{array}{r} \cdot047650 \\ 928\cdot7 \\ \hline 333550 \\ 38120 \\ 953 \\ 429 \\ \hline \cdot373052 \end{array}$$

CONTRACTION 2.

1. ·24650) ·57896 (2·3487
49300
8596
7395
1201
986
215
197
18
17

2. ·48730) ·91468 (1·8770
48730
42738
38984
3754
3411
343
341
2

3. ·67380) 6·8964 (10·235
67380
1584
1348
236
202
34
34

4. ·378500)8·74686(23·1092
7 57000
117686
113550
4136
3785
351
341
10
8

5.
·046870) ·0073500 (0·15681
46870
26630
23435
3195
2812
383
375
8
5

6.
·006875000)12·847590(1868·740
6875000
5972590
5500000
472590
412500
60090
55000
5090
4813
277
275
2

CONTRACTION 3.

1.	£·43541$\dot{6}$	5.	£·67291$\dot{6}$	9.	£4·33541$\dot{6}$
2.	·367708$\dot{3}$	6.	·890625	10.	7·786458$\dot{3}$
3.	·478125	7.	4·525	11.	2·65625
4.	·734375	8.	3·4291$\dot{6}$	12.	3·834375

CONTRACTION 4.

1.	£0,	8s.	$11\frac{3}{4}$d.	6.	£0,	16s.	$4\frac{1}{4}$d.	11.	£0,	17s.	$4\frac{1}{4}$d.
2.	0	6	6	7.	4	19	$7\frac{1}{2}$	12.	0	17	$5\frac{3}{4}$
3.	2	10	$8\frac{3}{4}$	8.	6	14	$10\frac{1}{2}$	13.	4	16	6
4.	0	13	$6\frac{3}{4}$	9.	4	19	$11\frac{3}{4}$	14.	6	19	$6\frac{3}{4}$
5.	0	18	1	10.	0	15	$11\frac{3}{4}$	15.	9	9	$4\frac{1}{2}$

EXERCISES IN FINITE DECIMALS.

1. £$4\frac{5}{16}$ = £4·3125
$22\frac{1}{2}$ = 22·5
£97, 0s. $7\frac{1}{2}$d. = £97·03125

2. cwt.
$18\frac{5}{8}$ cwt. = 18·625
$15\frac{2}{5}$ = 15·4
286 cwt. 3qr. $8\frac{2}{5}$lb. = 286·825

3. $\frac{253}{1280}$ qr. = 12·650 gal.
$12\frac{5}{8}$ ga. = 12·625 〃
$\frac{1}{5}$ pt. = ·025 gal.

4. $\frac{3}{4}$ = ·75000
$\frac{3}{8}$ of $\frac{3}{4}$ = $\frac{9}{32}$ = ·28125
Remainder, ·46875

5.
207s. $1\frac{7}{20}$d. = 2485·35d.; and 394s. 6d. = 4734d.; hence, 2485·35 ÷ 4734 = ·525

6.
7 + (·375 × 5) = 8·875 sh.,
∴ 8·875)£79·15625
A man's sh., £8·919$\frac{1}{71}$
·375
A boy's sh., £3·34463$\frac{2}{71}$

7. $11\frac{1}{4}$d. = £·046875
112
S. P. per cwt. = £5·25
B. P. 〃 = 4·20
Gain, 〃 = £1·05
18·625
Whole gain, = £19·55625

8.
Ye. 1 : 4·625 : : £4·25
£100 : £456·875
100 2113·046875 × 4·25
100)8980·44921875
Int., £89·8044921875

9.

$\underline{3{\cdot}5}$ yd. : $\underline{18{\cdot}625}$ yd. : : £1·8

$\cdot 7$ $\quad 3{\cdot}725 \times 1{\cdot}8$

$\cdot 7)\overline{6{\cdot}705}$

£9, 11s. $6\frac{3}{4}$d. $\frac{3}{7}$ = £$9{\cdot}578\frac{4}{7}$

10. $6\frac{1}{6}$s. $746\frac{1}{6}$s.

$\underline{6} \quad \underline{6}$

$37)\overline{4477}$

$\overline{121}$ poor.

11.

$$\begin{array}{r} \cdot 00673 \\ \cdot 00075 \\ \hline 3365 \\ 4711 \\ \hline \cdot 0000050475 \end{array}$$

$83)\overline{441500000}$

$5319277\frac{9}{83}$

12. 7 cwt. $3\frac{1}{2}$ qr = 31·5qrs.,
and 15 cwt. = 60 qrs.;
hence, $31{\cdot}5 \div 60 = \cdot 525$

13. £$\frac{7}{8}$ = 17s. 6d.
$\frac{2}{5}$ gu. = 8 4·8
Due, 9s. 1·2d.

INTERMINATE DECIMALS.

REDUCTION OF INTERMINATE DECIMALS.

PROBLEM I.

$\cdot\dot{7} = \frac{7}{9}$

$\frac{3}{9} = \frac{1}{3}$

$\frac{6}{9} = \frac{2}{3}$

$\frac{27}{99} = \frac{3}{11}$

$\frac{54}{99} = \frac{6}{11}$

$\frac{63}{999} = \frac{7}{111}$

$\frac{185}{999} = \frac{5}{27}$

$\frac{74}{999} = \frac{2}{27}$

$\frac{962}{999} = \frac{26}{27}$

$\frac{428571}{999999} = \frac{3}{7}$

$\frac{81}{9999} = \frac{9}{1111}$

$\frac{615384}{999999} = \frac{8}{13}$

$\frac{95238}{999999} = \frac{2}{21}$

$\frac{571428}{999999} = \frac{4}{7}$

$\frac{729}{999} = \frac{27}{37}$

$\frac{372}{999} = \frac{124}{333}$

$\frac{225}{999} = \frac{25}{111}$

PROBLEM II.

$\frac{583-58}{900} = \frac{525}{900} = \frac{7}{12}$

$\frac{2954-29}{9900} = \frac{2925}{9900} = \frac{13}{44}$

$$\frac{16-1}{90} = \frac{15}{90} = \frac{1}{6}$$

$$\frac{45}{990} = \frac{1}{22}$$

$$\frac{65296-65}{99900} = \frac{65231}{99900} = \frac{1763}{2700}$$

$$\frac{6}{900} = \frac{1}{150}$$

$$\frac{63729-63}{99900} = \frac{63666}{99900} = \frac{1179}{1850}$$

$$\frac{14873-1}{999900} = \frac{14872}{999900} = \frac{338}{22725}$$

$$\frac{83-8}{90} = \frac{75}{90} = \frac{5}{6}$$

$$\frac{149-14}{900} = \frac{135}{900} = \frac{3}{20}$$

$$\frac{57639-57}{99900} = \frac{57582}{99900} = \frac{3199}{5550}$$

$$\frac{576}{99900} = \frac{16}{2775}$$

$$\frac{948910-94}{9999000} = \frac{948816}{9999000} = \frac{11.8}{12625}$$

$$\frac{259}{999000} = \frac{7}{27000}$$

$$\frac{3378-3}{9990} = \frac{3375}{9990} = \frac{25}{74}$$

PROBLEM III.

1. $\cdot\dot{3}6363\dot{6}$
$\cdot\dot{4}6846\dot{8}$

2. $\cdot 0\dot{4}24\dot{2}$
$\cdot 1\dot{4}59\dot{1}$

3. $\cdot 00\dot{7}6767\dot{6}$
$\cdot 13\dot{7}1371\dot{3}$

4. $\cdot 333\dot{3}3333\dot{3}$
$\cdot 264\dot{1}8181\dot{8}$
$\cdot 405\dot{4}0540\dot{5}$

5. $\cdot 485\dot{4}5454\dot{5}$
$\cdot 762\dot{9}2792\dot{7}$

6. $\cdot 1\dot{5}3653\dot{6}$
$\cdot 0\dot{7}7777\dot{7}$
$\cdot 0\dot{0}2020\dot{2}$

7. $1\cdot 424\dot{2}4242\dot{4}$
$\cdot 000\dot{7}7777\dot{7}$
$\cdot 145\dot{9}2592\dot{5}$

8. $\cdot 00\dot{4}4444444444\dot{4}$
$\cdot 24\dot{5}9245924592\dot{4}$
$\cdot 16\dot{8}7687687687\dot{6}$

9. $\cdot 1\dot{2}9129129129\dot{1}$
$\cdot 0\dot{4}0104010401\dot{0}$
$1\cdot 0\dot{3}3333333333\dot{3}$

ADDITION AND SUBTRACTION OF INTERMINATE DECIMALS.

Case I.

1.
$$\begin{array}{r} 7{\cdot}023\dot{3} \\ {\cdot}666\dot{6} \\ {\cdot}525\dot{5} \\ {\cdot}008\dot{7} \\ \hline 8{\cdot}224\dot{3} \end{array}$$

2.
$$\begin{array}{r} 6{\cdot}33\dot{3} \\ {\cdot}06\dot{7} \\ {\cdot}14\dot{3} \\ {\cdot}08\dot{4} \\ \hline 6{\cdot}62\dot{8} \end{array}$$

3.
$$\begin{array}{r} 8{\cdot}009\dot{4} \\ {\cdot}444\dot{4} \\ {\cdot}066\dot{6} \\ {\cdot}007\dot{7} \\ \hline 8{\cdot}528\dot{3} \end{array}$$

4.
$$\begin{array}{r} {\cdot}3813\dot{3} \\ {\cdot}4222\dot{2} \\ {\cdot}5216\dot{6} \\ {\cdot}9472\dot{4} \\ \hline 2{\cdot}2724\dot{6} \end{array}$$

5.
$$\begin{array}{r} 15{\cdot}333\dot{3} \\ 34{\cdot}250\dot{0} \\ 0{\cdot}388\dot{8} \\ 16{\cdot}833\dot{3} \\ 0{\cdot}458\dot{3} \\ 7{\cdot}111\dot{1} \\ \hline 74{\cdot}3750 \end{array}$$

6.
$$\begin{array}{r} 17{\cdot}4166\dot{6} \\ 6{\cdot}5000\dot{0} \\ 16{\cdot}3333\dot{3} \\ 12{\cdot}0400\dot{0} \\ {\cdot}0175\dot{0} \\ \hline 52{\cdot}30750 \end{array}$$

7.
$$\begin{array}{r} \pounds 3{\cdot}33333\dot{3} \\ 7{\cdot}99583\dot{3} \\ 10{\cdot}62708\dot{3} \\ 0{\cdot}97500\dot{0} \\ 5{\cdot}66666\dot{6} \\ \hline \pounds 28{\cdot}59791\dot{6} \end{array}$$

8.
$$\begin{array}{r} {\cdot}71458\dot{3} \\ {\cdot}63437\dot{5} \\ \hline {\cdot}08020\dot{7} \end{array}$$

9.
$$\begin{array}{r} {\cdot}525\dot{0} \\ {\cdot}333\dot{3} \\ \hline {\cdot}191\dot{6} \end{array}$$

10.
$$\begin{array}{r} 14{\cdot}684\dot{4} \\ 2{\cdot}798\dot{6} \\ \hline 11{\cdot}885\dot{7} \end{array}$$

11.
$$\begin{array}{r} 12{\cdot}1\dot{1} \\ 7{\cdot}4\dot{0} \\ \hline 4{\cdot}7\dot{1} \end{array}$$

12.
$$\begin{array}{r} 16{\cdot}41\dot{6} \\ 7{\cdot}83\dot{3} \\ \hline 8{\cdot}58\dot{3} \end{array}$$

13.
$$\begin{array}{r} 21{\cdot}033\dot{3} \\ 0{\cdot}968\dot{2} \\ \hline 20{\cdot}065\dot{1} \end{array}$$

14.
$$\begin{array}{r} {\cdot}998958\dot{3} \\ {\cdot}029166\dot{6} \\ \hline {\cdot}969791\dot{6} \end{array}$$

15.
$$\begin{array}{r} \pounds 4{\cdot}28\dot{3} \\ 2{\cdot}61\dot{6} \\ \hline \pounds 1{\cdot}\dot{6} \end{array}$$

16.
$$\begin{array}{r} 14{\cdot}002777\dot{7}\text{ lb.} \\ 0{\cdot}420486\dot{1} \\ \hline 13{\cdot}582291\dot{6}\text{ lb.} \end{array}$$

17.
$$\begin{array}{r} 21{\cdot}291\dot{6}\text{ da.} \\ 12{\cdot}666\dot{6} \\ \hline 8{\cdot}6250\text{ da.} \end{array}$$

Case II.

1.
$$\begin{array}{r}\cdot715\dot{4}1541541541\dot{5}\\ \cdot315\dot{3}1531531531\dot{5}\\ \cdot872\dot{4}2394239423\dot{9}\\ \hline 1\cdot903\dot{1}5467312497\dot{0}\end{array}$$

2.
$$\begin{array}{r}\cdot79\dot{2}6732673267\dot{3}\\ \cdot33\dot{3}3333333333\dot{3}\\ \cdot51\dot{6}6666666666\dot{6}\\ \cdot40\dot{5}4054054054\dot{0}\\ \hline 2\cdot04\dot{8}0786727321\dot{3}\end{array}$$

3.
$$\begin{array}{r}\cdot\dot{4}2857\dot{1}\\ \cdot\dot{8}5714\dot{2}\\ \cdot\dot{4}5454\dot{5}\\ \cdot\dot{3}7037\dot{0}\\ \cdot\dot{3}5135\dot{1}\\ \hline 2\cdot\dot{4}6198\dot{1}\end{array}$$

4.
$$\begin{array}{r}\cdot07\dot{2}9729\dot{7}\\ \cdot00\dot{3}3333\dot{3}\\ \cdot14\dot{2}8571\dot{4}\\ \cdot45\dot{4}5454\dot{5}\\ \hline \cdot67\dot{3}7089\dot{0}\end{array}$$

5.
$$\begin{array}{r}7\cdot633\dot{3}33\dot{3}\\ \cdot045\dot{4}54\dot{5}\\ \cdot729\dot{5}72\dot{9}\\ \cdot004\dot{4}44\dot{4}\\ \hline 8\cdot412\dot{8}05\dot{2}\end{array}$$

6.
$$\begin{array}{r}\cdot94\dot{2}3076\dot{9}\\ \cdot71\dot{2}8205\dot{1}\\ \cdot33\dot{3}3333\dot{3}\\ \cdot83\dot{3}3333\dot{3}\\ \cdot58\dot{3}3333\dot{3}\\ \hline 3\cdot40\dot{5}1282\dot{0}\end{array}$$

7.
$$\begin{array}{r}17\cdot1954\dot{5}\dot{4}\\ 16\cdot5056\dot{8}\dot{1}\\ 14\cdot4261\dot{3}\dot{6}\\ \hline 48\cdot1272\dot{7}\dot{2}\end{array}$$

8.
$$\begin{array}{r}\cdot64\dot{2}8571\dot{4}\\ \cdot17\dot{8}5714\dot{2}\\ \hline \cdot46\dot{4}2857\dot{1}\end{array}$$

9.
$$\begin{array}{r}\cdot015\dot{3}8461\dot{5}\\ \cdot006\dot{3}5353\dot{5}\\ \hline \cdot009\dot{0}3108\dot{0}\end{array}$$

10.
$$\begin{array}{rr}\tfrac{13}{14}= & \cdot9\dot{2}8571\dot{4}\\ \tfrac{2}{3}= & \cdot6\dot{6}6666\dot{6}\\ \hline & \cdot2\dot{6}1904\dot{7}\end{array}$$

11.
$$\begin{array}{rr}18\tfrac{1}{12}= & 18\cdot08\dot{3}3333\dot{3}\\ 4\tfrac{5}{14}= & 4\cdot35\dot{7}1428\dot{5}\\ \hline & 1\dot{3}\cdot72\dot{6}1904\dot{7}\end{array}$$

12.
$$\begin{array}{rr}7\tfrac{2}{3}= & 7\cdot\dot{6}6666\dot{6}\\ 3\tfrac{6}{13}= & 3\cdot\dot{4}6153\dot{8}\\ \hline & 4\cdot\dot{2}0512\dot{8}\end{array}$$

13.
$$\begin{array}{rr}11\tfrac{19}{27}= & 11\cdot\dot{7}0\dot{3}\\ 5\tfrac{23}{37}= & 5\cdot\dot{6}2\dot{1}\\ \hline & 6\cdot\dot{0}8\dot{2}\end{array}$$

MULTIPLICATION OF INTERMINATE DECIMALS.

1.
$$\begin{array}{r}\cdot1\dot{6}\\ 7\\ \hline 1\cdot1\dot{6}\end{array}$$

2.
$$\begin{array}{r}27\cdot08\dot{3}\\ 9\\ \hline 243\cdot750\end{array}$$

3.
$$\begin{array}{r}\cdot40\dot{6}\\ 52\\ \hline 81\dot{3}\\ 2033\dot{3}\\ \hline 21\cdot14\dot{6}\end{array}$$

4.
$$\begin{array}{r}\cdot 27\cdot 88\dot{3}\\ 8\cdot 75\\ \hline 13941\dot{6}\\ 195183\dot{3}\\ 2230666\dot{6}\\ \hline 243\cdot 9791\dot{6}\end{array}$$

5.
$$\begin{array}{r}79\cdot\dot{6}\\ 50\\ \hline 3983\cdot\dot{3}\end{array}$$

6.
$$\begin{array}{r}84\cdot\dot{7}\\ 8000\\ \hline 678222\cdot\dot{2}\end{array}$$

7.
$$\begin{array}{r}\cdot\dot{4}8\dot{1}\\ 7\\ \hline 3\cdot\dot{3}7\dot{0}\end{array}$$

8.
$$\begin{array}{r}7\cdot\dot{5}1\dot{8}\\ \cdot 05\\ \hline \cdot 37\dot{5}9\dot{2}\end{array}$$

9.
$$\begin{array}{r}\cdot\dot{7}\dot{2}\\ 20\\ \hline 14\cdot\dot{5}\dot{4}\end{array}$$

10.
$$\begin{array}{r}4\cdot 3\dot{5}7142\dot{8}\\ 600\\ \hline 2614\cdot 2\dot{8}5714\dot{2}\end{array}$$

11.
$$\begin{array}{r}86\cdot 53\dot{2}1\dot{6}\\ 58\cdot 75\\ \hline 43266\dot{0}81\\ 605725\dot{1}3\dot{5}\\ 69225729\dot{7}\dot{2}\\ 432660810\dot{8}\dot{1}\\ \hline 5083\cdot 76452\dot{7}\dot{0}\end{array}$$

12.
$$\begin{array}{r}\cdot 3\dot{5}7142\dot{8}\\ \cdot 6875\\ \hline 17\dot{8}5714\dot{2}\\ 250000000\\ 2857\dot{1}4285\dot{7}\\ 21428\dot{5}7142\dot{8}\\ \hline \cdot 24553\dot{5}7142\dot{8}\end{array}$$

13.
$$\begin{array}{r}3)\cdot 6250\\ \hline \cdot 208\dot{3}\end{array}$$

14.
$$\begin{array}{r}87\cdot\dot{2}\\ 7\\ \hline 90)610\cdot\dot{5}\\ \hline 6\cdot 7\dot{8}3950617\dot{2}\end{array}$$

15.
$$\begin{array}{r}\cdot 845\\ 44\\ \hline 90)37\cdot 180\\ \hline \cdot 413\dot{1}\end{array}$$

16.
$$\begin{array}{r}87\cdot 34\\ 241\\ \hline 90)21048\cdot 94\\ \hline 233\cdot 877\dot{1}\end{array}$$

17.
$$\begin{array}{r}\cdot 62\dot{3}\\ 2\\ \hline 30)1\cdot 24\dot{6}\\ \hline \cdot 041\dot{5}\end{array}$$

18.
$$\begin{array}{r}3\dot{0}\dot{9}\\ 14\\ \hline 30)4\cdot 3\dot{2}\dot{7}\\ \hline \cdot 14\dot{4}\dot{2}\end{array}$$

19.
$$\begin{array}{r}\cdot 825\\ 4\\ \hline 11)3\cdot 300\\ \hline \cdot 3\end{array}$$

20.
$$\begin{array}{r}64\cdot 35\\ 17\\ \hline 22)1093\cdot 95\\ \hline 49\cdot 725\end{array}$$

21.
$$\begin{array}{r}16\cdot\dot{1}4\dot{5}\\ 106\\ \hline 96\dot{8}7\dot{0}\\ 1614\dot{5}1\dot{4}\\ \hline 185)1711\cdot\dot{3}8\dot{5}\\ \hline 9\cdot 250732\end{array}$$

22.
$$\begin{array}{r}\cdot 7\dot{2}1\dot{6}\\ 6\\ \hline 11)4\cdot\dot{3}29\dot{7}297\\ \hline \cdot 3\dot{9}3611\dot{7}\end{array}$$

23. $\cdot 94\dot{3}$
239
$1100)225\cdot 45\dot{6}$
$\cdot 2049\dot{6}\dot{0}$

24. $\cdot 63\dot{5}$
9472
$999)6019\cdot 98\dot{2}$
$6\cdot 026_{\frac{2}{243}}$

25. $67\frac{11}{18} = 67\cdot 6\dot{1}$
3
$8)202\cdot 8\dot{3}$
$25\cdot 3541\dot{6}$

26. $8\frac{11}{37} = 8\cdot\dot{2}9\dot{7}$
13
$24\dot{8}9\dot{1}$
$82\dot{9}7\dot{2}$
$22)107\cdot\dot{8}6\dot{4}8648$
$4\cdot\dot{9}02948\dot{4}$

27. $\frac{35}{54} = \cdot 6\dot{4}8\dot{1}$
44
$25\dot{9}2\dot{5}$
$259\dot{2}5\dot{9}$
$13)28\cdot\dot{5}1\dot{8}518$
$2\cdot\dot{1}9373\dot{2}$

28. $6\frac{2}{27} = 6\cdot\dot{0}7\dot{4}$
151
$37)917\cdot\dot{1}8\dot{5}$
$24\cdot\dot{7}8\dot{8}$

29. $8\frac{1}{12} = 8\cdot 08\dot{3}$
$\frac{1}{3} = 2\cdot 69\dot{4}$
$5\cdot 38\dot{8}$

30. $\frac{3}{11} = \cdot\dot{2}\dot{7}$
43
$45)11\cdot\dot{7}\dot{2}$
$\cdot 2\dot{6}\dot{0}$

DIVISION OF INTERMINATE DECIMALS.

1. $4)5\cdot 1\dot{6}$
$1\cdot 291\dot{6}$

2. $7)3\cdot\dot{3}7\dot{0}$
$\cdot\dot{4}8\dot{1}$

3. $37)4\cdot 1966\dot{2}$
$\cdot 1134\dot{2}$

4. $73\cdot 41\dot{6}$
$\cdot 16$
$11\cdot 74\dot{6}$

5. $3)15\cdot 0\dot{6}$
$5\cdot 0\dot{2}$
$10\cdot 0\dot{4}$

6. $\cdot 05)169\cdot\dot{3}$
$3386\cdot\dot{6}$

7. $\cdot 5)75\cdot 2\dot{6}$
$150\cdot 5\dot{3}$

8. $\cdot 1134$
9
$7)1\cdot 0206$
$\cdot 1458$

9. $23\cdot 5$
9
$4)211\cdot 5$
$52\cdot 875$

10. $8\cdot\dot{9}6\dot{2}$
3
$26\cdot 88\dot{8}$

11. $363\cdot 5\dot{4}0\dot{7}$
3
$145)1090\cdot 622\dot{2}$
$7\cdot 52_{\frac{40}{261}}$

12. 9
11
$5)99$
$19\cdot 8$

13. $\cdot 12693$
33
$640)4\cdot 18869$
$\cdot 0065448_{\frac{9}{32}}$

14. $17\cdot\dot{4}\dot{5}$
33
$28)576\cdot 00$
$20\cdot\dot{5}7142\dot{8}$

15. $\cdot 34\dot{7}4\dot{4}$
$\frac{1}{2} = \cdot 17\dot{3}7\dot{2}$
$\cdot 52\dot{1}1\dot{7}$

16.
$\cdot 24835$
27
$8)\overline{6\cdot 70545}$
$\cdot 83818\frac{1}{8}$

17.
$\frac{55}{72} = \cdot 763\dot{8}$
7
$50)\overline{5\cdot 347\dot{2}}$
$\cdot 1069\dot{4}$

18.
$\frac{26}{111} = \cdot\dot{2}3\dot{4}$
13
$5)\overline{3\cdot\dot{0}4\dot{5}}$
$\cdot 6\dot{0}9\dot{0}$

EXERCISES IN DECIMAL FRACTIONS.

1.
$\frac{1}{12}$ cwt. $= 9\cdot 3\dot{3}$ lb.
$\frac{1}{30}$ lb. $= 0\cdot 0\dot{3}$ „
Difference, $\overline{9\cdot 3}$ lb.

2.
$\frac{1}{5} = \cdot 2$
$\frac{1}{4}$ of $\cdot 2 = \cdot 05$
Share retained, $\overline{\cdot 15}$

3.
£$\frac{7}{8}$ = £$\cdot 8750$
£$\frac{5}{6}$ = $\cdot 833\dot{3}$
Gain per yd., £$\cdot 041\dot{6}$
79
$\overline{3\cdot 2916\dot{6}}$
$\frac{1}{6} = \cdot 0069\dot{4}$
Whole gain, £$3\cdot 2847\dot{2}$

4.
$112)$£$4\cdot 41\dot{6}$
Price per lb., £$\cdot 039435$
$\dot{6}19\cdot 76$
$\overline{23661}$
2760
355
4
2
Cost of $67\frac{11}{12}$ lb., £$\overline{2\cdot 6782}$

5.
$49\underset{\cdot}{3}\cdot\underset{\cdot}{5})$£$422\cdot\dot{4}\dot{5}($£$\cdot 856$ per [gal.
$394\,80$
$\overline{2765}$
2468
$\overline{297}$
296

6.
£$\cdot 91\dot{6} \div 7 =$ £$\cdot 13\dot{0}9523\dot{8} =$
2s. $7\frac{1}{4}$d. $\frac{5}{7}$ each.

7.
£$\cdot 88\dot{3}$
$\overline{17\cdot 6\dot{6}}$s.
$8\cdot\overline{00}$d.

$\cdot 568\dot{6}$ cr
$\overline{2\cdot 843\dot{3}}$s.
$10\cdot\overline{1200}$d.

$\cdot 372\dot{5}$ cwt.
$1\cdot 490\dot{2}$ qr.
$13\cdot 726\dot{2}$ lb.
$11\cdot 619\dot{5}$ oz.
$9\cdot 912\dot{8}$ dr.

7.

$5{\cdot}393\dot{7}$ fur.
$15{\cdot}751\dot{1}$ pol.
$4{\cdot}131\dot{1}$ yd.
$4{\cdot}7200$ inch.

$\cdot 58\dot{3}$ gu.
$12{\cdot}250$s.
$3{\cdot}000$d.

8.

$\cdot 67\dot{4}\dot{5}$ gu.
$14{\cdot}16\dot{5}\dot{4}$s.
$1{\cdot}98\dot{5}\dot{4}$d.
$3{\cdot}94\dot{1}\dot{8}$ qr.

$\cdot 419\dot{6}4\dot{4}$ cwt.
$1{\cdot}\dot{6}78\dot{5}$ qr.
$19{\cdot}0\dot{0}0\dot{2}$ lb.

£$\cdot 75\dot{3}0\dot{7}$
$15{\cdot}0\dot{6}1\dot{4}$s.
$0{\cdot}7\dot{3}7\dot{5}$d.
$2{\cdot}9\dot{5}0\dot{1}$ qr.

$\cdot 8\dot{4}72\dot{5}$ ac.
$3{\cdot}3\dot{8}90\dot{1}$ ro.
$15{\cdot}\dot{5}60\dot{7}$ per.
$16{\cdot}96\dot{2}87\dot{1}$ yd.

9.

£100 : £$57{\cdot}7\dot{8}5714\dot{2}$ :: £$\frac{5}{12}$
5
$1200)288{\cdot}9\dot{2}8571\dot{4}28$
4s. $9\frac{3}{4}$d. $\frac{1}{7}$ = £$\cdot 24077\dot{3}8095\dot{2}$

10.

cwt. $17{\cdot}375$: cwt. $5{\cdot}5$ :: ml. $19\frac{1}{3}$
£$\cdot 8\frac{1}{3}$ £$3 - \frac{1}{7}$ 58
$13{\cdot}9000$ $16{\cdot}5$
$\cdot 5791\frac{2}{3}$ $- \cdot 7\frac{6}{7}$
$14{\cdot}4791\frac{2}{3}$ $15{\cdot}7\frac{1}{7}$
$43{\cdot}4375 \times 7$ $110{\cdot}0 \times 58$
$304{\cdot}0625)6380{\cdot}0000$
$20{\cdot}982$ ml.

11.

$3 : \frac{5}{7}$ :: £1921
$640{\cdot}\dot{3} \times 5$
$7)3201{\cdot}\dot{6}$
£457, 7s. $7\frac{1}{4}$d. $\frac{5}{7}$ = £$457\frac{8}{21}$

12.

£$83{\cdot}68\frac{1}{3} \times 4{\cdot}625 \times \frac{6}{18} \div 100$
$=$ £$\frac{251{\cdot}05}{3} \times \frac{28{\cdot}125}{18} \times \frac{1}{100} =$
£$\frac{5805{\cdot}53125}{5400} =$ £$1\frac{12977}{172800} =$
£1, 1s. $6\frac{17}{720}$d.

13.

	oz.	dwt.	gr.
$\cdot 78\dot{3}$ lb. =	9	8	0
$\cdot 72\dot{4}$ oz. =	0	14	$11{\cdot}73\dot{3}$
$\cdot 87\dot{5}$ dwt. =	0	0	$21{\cdot}01\dot{3}$
	10	3	$8{\cdot}74\dot{6}$
$-\cdot 98\dot{4}$ gr. =	0	0	$0{\cdot}98\dot{4}$
Value,	10	3	$7{\cdot}76\dot{2}$

14.

$3{\cdot}14159000)24899{\cdot}06738534$
Diameter, $7925{\cdot}626$ ml.

15.
3 qr. 16 lb. = 100 lb., and
57 qr. 4 lb. = 1600 lb.; hence
100 ÷ 1600 = ·0625

16.
·06704
·000576
40224
46928
33520
·00003861504

8)1728000
216000

17.
£275, 3s. 4d. = £275·1$\dot{6}$
179 16 8 = 179·8$\dot{3}$
£95, 6s. 8d. = £95·3$\dot{3}$

18.

	£	s.	d.		£	s.	d.
$\frac{5}{6}$ of	5	7	9	=	4	9	9½
$\frac{5}{11}$ of	7	14	11	=	3	10	5
$\frac{7}{12}$ of	6	19	6	=	4	1	4½
					12	1	7
$\frac{3}{4}$ of	5	15	6	=	4	6	7½
Value,					£7	14	11½

19.
3141·59
87
2199113
2513272
Circumf., 273318·33 ml.

20.
£6700
·375
1st family, £2512·5
2d 〃 £4187·5
then,
£2512·5 ÷ 7 = £358·9$\frac{2}{7}$, each of 1st family receives; and
£4187·5 ÷ 9 = £465·2$\dot{7}$ each of 2d family receives.

21.
4 + (3 × ·625) = 5·875 sha., £457·625 ÷ 5·875 = £77, 17s. 10¼d. $\frac{41}{47}$, a man's sha., and £77, 17s. 10¼d. $\frac{41}{47}$ × $\frac{5}{8}$ = £48, 13s. 8$\frac{2}{47}$d. a boy's share.

22. £4·5 : £29·75 :: £100
Ye. 1·125 : 1 / 4
·9 1·19
·009 1
·0081 1·19 × 4
·0081)4·76
£587·654321

23. $\frac{1}{20}$ + $\frac{1}{30}$ = ·05 + ·03$\dot{3}$ = ·08$\dot{3}$ part filled in 1 hour; hence,
·08$\dot{3}$: 1 :: 1 ho. : 12 ho.

24. $\frac{3}{4}$ × $\frac{5}{6}$ yd. : $\frac{7}{8}$ × 17·$\dot{3}$ yd. :: £·7708$\dot{3}$: $\frac{8}{5}$ × $\frac{7}{8}$ × 17·$\dot{3}$ × £·7708$\dot{3}$ = £18·70$\dot{5}$ = £18, 14s. 1¼d. $\frac{1}{3}$

25. $(6{\cdot}52\dot{7}\text{ yd.} + 5{\cdot}2\dot{7}\text{ yd.}) \times 2 \times 3{\cdot}\dot{1}\text{ yd.} = 73{\cdot}4568\text{ s. yd.}$ to be covered; hence, $73{\cdot}4568\text{ yd.} \times 1{\cdot}6 = 117{\cdot}53088$ yards required.

ALLOWANCES ON GOODS.

1.	cwt.	qr.	lb.
	0	0	23
			58
Tare,	11	3	18

2.	cwt.	qr.	lb.
	19	3	16
Tare,	0	0	26
	19	2	18
			33
Net,	648	3	6

3.	cwt.	qr.	lb.
	32	1	19
Tare,	0	1	9
	32	0	10
			42
Net,	1347	3	0

4.	cwt.	qr.	lb.
	3	1	18
Tare,	0	1	6
	3	0	12
			37
Net,	114	3	24

5.	cwt.	qr.	lb.
	17	2	24
Tare,	0	1	10
	17	1	14
			93
Net,	1615	3	14

6.	cwt.	qr.	lb.
	0	3	27
Tare,	0	0	21
	0	3	6
			39
Net,	31	1	10

7.	cwt.	qr.	lb.
	468	3	16
Tare, $\frac{1}{8}$ cwt.	58	2	$12\frac{1}{2}$
Net,	410	1	$3\frac{1}{2}$

8.	cwt.	qr.	lb.
	315	2	21
Tare, $\frac{1}{7}$ cwt.	45	0	11
Net,	270	2	10

9.	cwt.	qr.	lb.
	896	1	14
Tare, $\frac{1}{14}$ cwt.	64	0	3
Net,	832	1	11

10.	cwt.	qr.	lb.
	786	3	21
16 lb. = $\frac{1}{7}$ cwt.	112	1	19
8 〃 = $\frac{1}{2}$ of 16 lb.	56	0	$23\frac{1}{2}$
Tare,	168	2	$14\frac{1}{2}$
Net,	618	1	$6\frac{1}{2}$

11.	cwt.	qr	lb.
	336	3	14
14 lb. = $\frac{1}{8}$ cwt.	42	0	$12\frac{1}{4}$
7 〃 = $\frac{1}{2}$ of 14 lb.	21	0	$6\frac{1}{8}$
Tare,	63	0	$18\frac{3}{8}$
Net,	273	2	$23\frac{5}{8}$

12.	cwt.	qr.	lb.
	448	0	14
16 lb. = $\frac{1}{7}$ cwt.	64	0	2
2 〃 = $\frac{1}{8}$ of 16 lb.	8	0	$0\frac{2}{8}$
1 〃 = $\frac{1}{2}$ 〃 2 〃	4	0	$0\frac{1}{8}$
Tare,	76	0	$2\frac{3}{8}$
Net,	372	0	$11\frac{5}{8}$

13.

	cwt.	qr.	lb.
	22	2	15
			3
	67	3	17
16 lb. = $\frac{1}{7}$ cwt.	9	2	$22\frac{3}{7}$
2 〃 = $\frac{1}{8}$ of 16 lb.	1	0	$23\frac{45}{56}$
Tare,	10	3	$18\frac{13}{56}$
Net,	56	3	$26\frac{43}{56}$

14.

	cwt.	qr.	lb.
	73	0	16
			5
	365	2	24
16 lb. = $\frac{1}{7}$ cwt.	52	0	$27\frac{3}{7}$
8 〃 = $\frac{1}{2}$ of 16 lb.	26	0	$13\frac{5}{7}$
1 〃 = $\frac{1}{8}$ of 8 lb.	3	1	$1\frac{5}{7}$
Tare,	81	2	$14\frac{6}{7}$
Net,	284	0	$9\frac{1}{7}$

15.

	cwt.	qr.
	2	2
		12
	30	0
Tare, $\frac{1}{8}$ cwt.,	3	3
Net,	26	1

16.

	cwt.	qr.	lb.
	6	0	14
			27
	165	1	14
Tare, $\frac{1}{7}$ cwt.,	23	2	14
Net,	141	3	0

17.

	cwt.	qr.	lb.
	134	2	16
16 lb. = $\frac{1}{7}$ cwt.	19	0	$26\frac{2}{7}$
8 〃 = $\frac{1}{2}$ of 16 lb.	9	2	$13\frac{1}{7}$
Tare,	28	3	$11\frac{3}{7}$
Net,	105	3	$4\frac{4}{7}$

18.

	cwt.	qr.	lb.
	4	0	18
			37
	153	3	22
8 lb. = $\frac{1}{14}$ cwt.	10	3	$27\frac{4}{7}$
4 〃 = $\frac{1}{2}$ of 8 lb.	5	1	$27\frac{11}{14}$
1 〃 = $\frac{1}{4}$ of 4 lb.	1	1	$13\frac{53}{56}$
Tare,	17	3	$13\frac{17}{56}$
Net,	136	0	$8\frac{39}{56}$

19.

	cwt.	qr.	lb.
	8	3	16
Tare,	0	2	14
	8	1	2
			4
Net,	33	0	8

20.

	cwt.	qr.	lb.
	3	0	16
			12
13)	37	2	24
Tret,	2	3	$16\frac{12}{13}$

21.

	cwt.	qr.	lb.
26)	96	3	14
Tret,	3	2	$25\frac{4}{13}$

22.

	cwt.	qr.	lb.
	6786	2	0
16 lb. = $\frac{1}{7}$ cwt.	969	2	0
2 〃 = $\frac{1}{8}$ of 16 lb.	121	0	21
Tare,	1090	2	21
Tare sut.,	5695	3	7
Tret, $\frac{1}{26}$ =	219	0	$7\frac{21}{26}$
Net,	5476	2	$27\frac{5}{26}$

23.

cwt. qr. lb.
16 3 16
7
118 1 0
16 lb. $= \frac{1}{7}$ cwt. 16 3 16
4 〃 $= \frac{1}{4}$ of 16 lb. 4 0 25
Tare, 21 0 13
Tare sut., 97 0 15
Tret, $\frac{1}{26} =$ 3 2 $26\frac{11}{26}$
Net, 93 1 $16\frac{15}{26}$

24.

cwt. qr. lb.
13 0 24
5
66 0 8
8 lb. $= \frac{1}{14}$ cwt. 4 2 $24\frac{4}{7}$
4 〃 $= \frac{1}{2}$ of 8 lb. 2 1 $12\frac{2}{7}$
Tare, 7 0 $8\frac{6}{7}$
Tare sut., 58 3 $27\frac{1}{7}$
Tret $\frac{1}{26} =$ 2 1 $2\frac{11}{91}$
Net, 56 2 $25\frac{2}{91}$

25.

392 lb.
14
5488
14 lb. $= \frac{1}{8}$ cwt. 686
1 〃 $= \frac{1}{14}$ of 14 lb. 49
Tare, 735
Net, 4753 lb.
Also,
$4753 \div 7\frac{1}{2} = 633$ ga. $5\frac{13}{15}$ pt.

26.

313 lb.
Draft = 1
312
$2\frac{1}{2}$
100)780
Tare, $7\frac{4}{5}$
Net, $304\frac{1}{5}$ lb.
Also,
1s. 9d. $= \frac{1}{12}$ gu.)$304\frac{1}{5}$ gu.
20)25g. 7s. $4\frac{1}{5}$d.
1 〃 5 〃 0
Pr. of 1 bag, £26, 12s. $4\frac{1}{5}$d.
〃 36 bags, £958, 4s. $7\frac{1}{5}$d.

27.

$7308 \div 16 = 456\frac{3}{4}$ stones
Gratis $= \frac{1}{21} = 21\frac{3}{4}$
Paid for, 435 stones
Also,
3s. 4d. $=$ £$\frac{1}{6}$) £435
£72, 10s.
4d. $= \frac{1}{10}$ of $3\frac{1}{3}$s. 7 5
Paid for it, £79, 15

28.

78 lb.
Alloy, $\frac{1}{11} = 7\frac{1}{11}$
Pure, $70\frac{10}{11}$ lb.

29.

162 gross
144
151)23328
Paid for, $154\frac{74}{151}$ gross

30.

7)4500 bush.
$642\frac{6}{7}$ bush. malt.

31. 285 bush.
3
40)855
Inlake, 21$\frac{3}{8}$ bush.
Dry, 263$\frac{5}{8}$ bush.

32. £1260
13
20)16380
Increase, £819
Present capital, £2079

COMMISSION AND BROKERAGE.

1. £978, 0s. 0d.
2$\frac{1}{8}$
100)2078 5 0
Com., £20, 15s. 7$\frac{3}{4}$d. $\frac{1}{5}$

2. £436, 13s. 0d.
2$\frac{3}{4}$
873 6 0
$\frac{1}{2}$ = 218 6 6
$\frac{1}{4}$ = 109 3 3
100)1200 15 9
Com., £12, 0s. 1$\frac{3}{4}$d. $\frac{14}{25}$

3. £853, 0s. 0d.
$\frac{6}{12}$ = $\frac{1}{2}$ = 426 10 0
$\frac{1}{12}$ = 71 1 8
100)1350 11 8
Com., £13, 10s. 1$\frac{1}{4}$d. $\frac{3}{5}$

4.
2$\frac{1}{2}$s. = £$\frac{1}{8}$)£1242, 0s. 0d.
100)155 5 0
Com., £1, 11s. 0$\frac{1}{2}$d. $\frac{2}{5}$

5.
3$\frac{1}{3}$s. = £$\frac{1}{6}$)£957, 0s. 0d.
100)159 10 0
Com., £1, 11s. 10$\frac{3}{4}$d. $\frac{1}{5}$

6.
5s. = £$\frac{1}{4}$)£937, 0s. 0d.
234 5 0
2$\frac{1}{2}$s. = £$\frac{1}{8}$, 117 2 6
100)351 7 6
Com., £3, 10s. 3$\frac{1}{4}$d. $\frac{1}{5}$

7. £197, 13s. 4d.
$\frac{4}{8}$ = $\frac{1}{2}$ = 98 16 8
$\frac{1}{8}$ = 24 14 2
100)£321, 4s. 2d.
Com., £3, 4s. 2$\frac{3}{4}$d. $\frac{3}{5}$

8. $\frac{1}{8}$)£673, 17s. 0d.
100) 84 4 7$\frac{1}{2}$
Com., £0, 16s. 10$\frac{0}{4}$d. $\frac{31}{50}$

9.
4s. = £$\frac{1}{5}$)£754, 14s. 4d.
100)150 18 10$\frac{1}{4}$ $\frac{3}{5}$
Com., £1, 10s. 2$\frac{1}{4}$d. $\frac{7}{125}$

10.
4s. = £$\frac{1}{5}$)£598 0s. 0d.
119 12 0
6d. = $\frac{1}{8}$ of 4s. 14 19 0
100)134 11 0
Com., £1, 6s. 10$\frac{3}{4}$d. $\frac{17}{25}$

11. 2½s.=£⅛)£675, 0s. 0d.
84 7 6
3d.=1/10 of 2½s. 8 8 9
100)92 16 3
Com., £0, 18s. 6¾d.

12. ½)£820 0s.
100)410 0
Com., £4, 2s.

13. £764, 0s. 0d.
3½
2292 0 0
382 0 0
100)2674 0 0
Com., £26, 14s. 9½d. ⅖

14. £829, 0s. 0d.
2
1658 0 0
−⅛=103 12 6
100)1554 7 6
Com., £15, 10s. 10½d.

15. £689, 17s. 0d.
12½
8278 4 0
344 18 6
100)8623 2 6
Com., £86, 4s. 7½d.

16. 20)£678, 19s. 8d.
Com., £33, 18s. 11¾d. ⅕

17. £14780, 0s.
4¼
59120 0
3695 0
100)62815 0
Com., £628 3s.
Losses, 230 0
Net income, £398, 3s.

18. Woollen, £1260, 0s.
Muslin, 1450 0
Hardware, 850 0
3560 0
2⅛
7120 0
445 0
100)7565 0
Com., £75, 13s.

19.
3s. 4d. = £⅙)£2840, 0s. 0d.
473 6 8
5d.=⅛ of 3⅓s. 59 3 4
100)532 10 0
Brokerage, £5, 6s. 6d.

20. £2200, 0s. 0d.
2¼
4400 0 0
550 0 0
100)4950 0 0
Com., £49, 10s. 0d.
Charges, 754 14 8
Amount, £804 4s. 8d.
Net. Proc., £1395, 15s. 4d.

21.	£784,	14s.	6d.
			12½
	9416	14	0
	392	7	3
	100)9809	1	3
Duty,	£98,	1s.	9¾d.

22.	£654,	14s.	8d.
	4	3	8
	658	18	4
			3
	1976	15	0
— ¼ =	164	14	7
	100)1812	0	5
Com.,	£18,	2s.	4¾d. ⅖
Am.ofInv.,	£677,	0s.	8¾d. ⅖

23.	£20178,	17s.	6½d.	5s. = £¼)	£600,	17s.	6d.
			5½		150	4	4½
	10089	8	9¼	2½s. = of 5s.	75	2	2¼
	100894	7	8½	7s. 6d. per £ =	225	6	6¾
	100)110983	16	5¾	Losses,	300	17	0
Com.,	£1109,	16s.	$9\frac{0}{4}$d. $\frac{71}{100}$	—	£526,	3s.	6¾d.

£583, 13s. 2¼d. $\frac{71}{100}$, his net income.

INSURANCE.

	£	s.	d.
1. 1s. = £$\frac{1}{20}$)	3450	0	0
	172	10	0
6d. = ½s. =	86	5	0
	100)258	15	0
Prem.,	£2	11	9
Duty, 35s. × 3,	5	5	0
Whole exp.,	£7	16	9

	£	s.	d.
3. $\frac{1}{20}$)	3750	0	0
	187	10	0
	3937	10	0
			2
	100)7875	0	0
Prem.,	£78	15	0
Duty, 38s. × 3,	5	14	0
Com., £37½ × ½,	18	15	0
Whole exp.,	£103	4	0

	£	s.	d.
2. 2s. 6d. = £⅛)	375	0	0
	100)46	17	6
Prem.,	£0	9	4½
Duty, 1½s. × 4,	0	6	0
Whole exp.,	£0	15	4½

	£	s.	d.
4.	4735	0	0
			2½
	100)11837	10	0
Prem.,	£118	7	6
Duty, 48s. × 3,	7	4	0
Whole exp.,	£125	11	6

£ s. d.
5. 10s. = £$\frac{1}{2}$)65 13 4
32 16 8
2$\frac{1}{2}$s. = $\frac{1}{4}$ of 10s. 8 4 2
100)41 0 10
Prem., £0 8 2$\frac{1}{2}$
Duty, 0 0 6
Whole exp., £0 8 8$\frac{1}{2}$

£ s. d.
6. $\frac{1}{20}$)275 16 8
13 15 10
289 12 6
1$\frac{1}{2}$
100)434 8 9
Prem., £4 6 10$\frac{1}{2}$ $\frac{3}{5}$
Duty, 3s.×2, 0 6 0
Whole exp., £4 12 10$\frac{1}{2}$ $\frac{3}{5}$

£ s. d.
7. $\frac{1}{20}$)2650 0 0
132 10 0
2782 10 0
3$\frac{1}{2}$
100)9738 15 0
Prem., £97 7 9
Duty, 27s.×4, 5 8 0
Disct.,£5$\frac{3}{4}$×2, 11 10 0
£575 — £114 5 9
Recovered, £460, 14s. 3d.

£ s. d.
8. 4325 0 0
1$\frac{3}{4}$
100)7568 15 0
Prem., £75 13 9
Duty, £44×$\frac{1}{10}$ 4 8 0
Disct.,£3$\frac{3}{4}$×1$\frac{1}{2}$ 5 12 6
£375 — £85 14 3
Sum recovd., £289, 5s. 9d.

9.
575 ÷ 100 = £2, 14s. 6d.
5$\frac{3}{4}$
£13 12 6
$\frac{1}{2}$ = 1 7 3
$\frac{1}{4}$ = 0 13 7$\frac{1}{2}$
Annual premium, £15, 13s. 4$\frac{1}{2}$d.

---

10. £100—£4, 4s.=£95·8; hence,
£95·8 : £100 : : £574·8
95·8)57480
Sum, £600

11. £100—£2, 2s. = £97·9; hence,
£97·9 : £100 : : £2349·6
97·9)234960
Sum, £2400

12. £100—£1, 6s. = £98·7; hence,
£98·7 : £100 : : £197·4
98·7)19740
Sum, £200

13.
£100—£2,16s.6d.=£97·175; hence,
£97·175 : £100 : : £1166·1
97·175)116610
Sum, £1200

14.
£100 — £1, 17s. = £98·15;
hence,
£98·15 : 100 : : £5889
98·15)588900
Sum, £6000

15.
£100—£3,17s. 6d.=£96·125
Hence,
£96·125 : £100 : : £7690
96·125)769000
Sum, £8000

16.
£100—£5$\frac{1}{4}$=£94$\frac{3}{4}$=379 cr.;
hence,
Cr. 379 : 400 : : £560
Cr. 379 : 400
143641 160000×560
143641)89600000
Sum, £623, 15s. 6$\frac{1}{2}$d. $\frac{34534}{143641}$

17.
£100 — £8$\frac{3}{8}$ = £91$\frac{5}{8}$;
hence,
458 : 500 : : £1280
458 : 500 320
229 500
229 500
52441 250000×320
52441)80000000
Sum, £1525, 10s. 5$\frac{1}{2}$d. $\frac{50618}{52441}$

18.
£100 — £7$\frac{7}{8}$ = £92$\frac{1}{8}$;
hence,
H. Cr. 737 : 800 : : £800
H. Cr. 737 : 800
543169 640000×800
543169)512000000
Sum, £942, 12s. 3$\frac{3}{4}$d. $\frac{349041}{543169}$

19.
£100 — £4$\frac{1}{8}$ = £95$\frac{7}{8}$;
hence,
479 : 500 : : £760
479 : 500
229441 250000×760
229441)190000000
Sum, £828, 1s. 11$\frac{3}{4}$d. $\frac{141025}{229441}$

20.
£100—£3, 3s.=£96, 17s.=
1937s.; hence,
1937s. : 2000s. : : £840
1937s. : 2000s.
3751969 4000000×840
3751969)3360000000
Sum, £895, 10s. 7$\frac{558737}{3751969}$d.

21.
£100—£7, 7s.=£92, 13s.=
1853s.; hence,
1853s. : 2000s. : : £3240
1853s. : 2000s.
3433609 4000000 × 3240
3433609)12960000000
Sum, £3984, 2s. 11$\frac{342346}{3433609}$d.

CALCULATION OF AVERAGES.

22.	£1300 freight.		$\frac{1}{3}$)£877, 10s. the damage.
	3200 va. of ship.		292 10 for newness.
	7200 „ of cargo.		£585 damage to be paid.
	£11700 „ of ship and cargo.		

Hence, £11700 : £585 :: £100 : £5 p. c. av. loss.

£4500 owner's interest; the loss on which is	£225
£5600 insurer's interest; the loss on which is	280
£1600 freighter's interest; the loss on which is	80
Loss as above,	£585

23.	Replacing mast, etc.,	£600		
	Deduct $\frac{1}{3}$ for newness,	200		
		400	Value of ship,	£6000
	Anchor valued at . .	60	Do. of cargo,	10000
	20 pipes wine at £80,	1600	Net freight,	1500
	Whole loss,	£2060	Whole value,	£17500

£17500 : £100 :: £2060 : £11, 15s. $5\frac{1}{7}$d. gen. av. loss p. c.

£25×80 : £25×30 :: £100 : £37, 10s. partic. av. loss p. c.

£11, 15s. $5\frac{1}{7}$d. × 35 = £412, Owners of vessel lose.
£11, 15s. $5\frac{1}{7}$d.×90+£375=£1434, 8s. $6\frac{6}{7}$d., Insurers lose.
£11,15s.$5\frac{1}{7}$d.×50+£375=£963,11s.$5\frac{1}{7}$d.,Own.of car. lose.

24.

Premium on £2400 at 10 gu. per cent.		£252, 0s. 0d.	
Claim on 20 hhds. not shipped, at $\frac{1}{6}$ p. c.		4 0 0	
Whole cost,		£256 0 0	
Return of prem. on 20 hhds. not shipped,	£84, 0s. 0d.		
Claim on Insurer for particular average,	346 6 $6\frac{1}{2}$ $\frac{48}{1021}$		
Return for convoy,	65 16 $4\frac{1}{4}$ $\frac{116}{1021}$	496 2 $10\frac{3}{4}$ $\frac{161}{1021}$	
Due by the Insurers,		£240, 2s. $10\frac{3}{4}$d. $\frac{161}{1021}$	

SIMPLE INTEREST.

CASES I. AND II.

1. £754, 14s. 8$\frac{3}{4}$d.
4
100)3018 18 11
Interest, £30, 3s. 9$\frac{1}{4}$d. $\frac{22}{25}$

2. £1256, 14s. 8$\frac{1}{2}$d.
7
8797 2 11$\frac{1}{2}$
3$\frac{1}{2}$
100)30790 0 4$\frac{1}{4}$
Interest, £307, 18s. 0$\frac{0}{4}$d. $\frac{17}{100}$

3. £928, 18s. 0d.
8$\frac{3}{4}$
8127 17 6
4$\frac{5}{8}$
100)37591 8 5$\frac{1}{4}$
Int., £375, 18s. 3$\frac{1}{4}$d. $\frac{13}{20}$

4. £ s. d.
6 mo.=$\frac{1}{2}$ ye.) 2346 0 0
9
21114 0 0
1173 0 0
1m.=$\frac{1}{6}$of6m. 195 10 0
22482 10 0
4$\frac{7}{12}$
100)103044 15 10
Int., £1030 8 11$\frac{1}{2}$d.

5. £ s. d.
6 m.=$\frac{1}{2}$ ye.)127 15 7$\frac{1}{2}$
63 17 9$\frac{3}{4}$
1 m.=$\frac{1}{6}$of6m.10 12 11$\frac{1}{2}$ $\frac{1}{2}$
202 6 4$\frac{3}{4}$ $\frac{1}{2}$
4$\frac{1}{5}$
100)849 14 10$\frac{3}{4}$ $\frac{1}{2}$
Int., £8 9 11$\frac{1}{4}$ $\frac{31}{200}$

6. £98, 19s. 6d.
−$\frac{1}{12}$= 8 4 11$\frac{1}{2}$
90 14 6$\frac{1}{2}$
4
362 18 2
−$\frac{1}{16}$= 22 13 7$\frac{1}{2}$ $\frac{1}{2}$
100)340 4 6$\frac{1}{4}$ $\frac{1}{2}$
Int., £3, 8s. 0$\frac{1}{2}$d. $\frac{7}{40}$

7. £ s. d.
4 m.=$\frac{1}{3}$ ye.)364 17 5
121 12 5$\frac{1}{2}$ $\frac{2}{3}$
1m.=$\frac{1}{4}$of4m. 30 8 1$\frac{1}{4}$ $\frac{2}{3}$
152 0 7$\frac{0}{4}$ $\frac{1}{3}$
3$\frac{1}{4}$
456 1 9$\frac{1}{4}$
38 0 1$\frac{3}{4}$ $\frac{1}{12}$
100)494 1 11$\frac{0}{4}$ $\frac{1}{12}$
Int., £4 18 9$\frac{3}{4}$ $\frac{77}{240}$

8.

£ s. d.

$6\text{m.} = \frac{1}{2}\text{ye.})18\ \ 8\ \ 9\frac{1}{2}$

$3\text{m.} = \frac{1}{4}\text{ye.}\ \ 9\ \ 4\ \ 4\frac{3}{4}$

$27\ \ 13\ \ 2\frac{1}{4}$

$4\frac{1}{3}$

$100)119\ \ 17\ \ 1\frac{3}{4}$

Int., $£1\ \ 3\ \ 11\frac{1}{2}\ \frac{63}{100}$

9.

£ s. d.

$4\text{w.} = \frac{1}{13}\text{ye.})560\ \ 0\ \ 0$

$43\ \ 1\ \ 6\frac{1}{4}\ \frac{11}{13}$

$2\text{w.} = \frac{1}{2}\text{of }4\text{w.}\ 21\ \ 10\ \ 9\frac{0}{4}\ \frac{12}{13}$

$1\text{w.} = \frac{1}{2}$ " 2 " $10\ \ 15\ \ 4\frac{1}{2}\ \frac{6}{13}$

$25)75\ \ 7\ \ 8\frac{1}{4}\ \frac{3}{13}$

Interest, $£3\ \ 0\ \ 3\frac{1}{2}\ \frac{10}{13}$

10.

£ s. d.

$13\text{w.} = \frac{1}{4}\text{ye.})1240\ \ 0\ \ 0$

$310\ \ 0\ \ 0$

$4\text{w.} = \frac{1}{13}\text{ye.}\ \ 95\ \ 7\ \ 8\frac{1}{4}\ \frac{3}{13}$

$2\text{w.} = \frac{1}{2}\text{of }4\text{w.}\ 47\ \ 13\ \ 10\frac{0}{4}\ \frac{8}{13}$

$453\ \ 1\ \ 6\frac{1}{4}\ \frac{11}{13}$

3

$100)1359\ \ 4\ \ 7\frac{1}{4}\ \frac{7}{13}$

Interest, $£13\ \ 11\ \ 10\frac{8}{13}$

11.

£ s. d.

$3204\ \ 14\ \ 0$

37

$7300)118573\ \ 18\ \ 0$

Interest, $£16\ \ 4\ \ 10\frac{1}{4}\ \frac{7}{25}$

12.

£ s. d.

$780\ \ 14\ \ 9\frac{1}{2}$

36

$28106\ \ 12\ \ 6$

$4 \times 2 =\ \ 8$

$73000)224853\ \ 0\ \ 0$

Interest, $£3\ \ 1\ \ 7\frac{443}{1825}$

13.

£ s. d.

$874\ \ 18\ \ 8\frac{3}{4}$

29

$25373\ \ 3\ \ 1\frac{3}{4}$

$4\frac{1}{4} \times 2 =\ \ 8\frac{1}{2}$

$73000)215671\ \ 16\ \ 8\frac{3}{4}\ \frac{1}{8}$

Interest, $£2\ \ 19\ \ 1\frac{33927}{584000}$

14.

£ s. d.

$910\ \ 15\ \ 0$

68

$61931\ \ 0\ \ 0$

$4\frac{1}{2} \times 2 =\ \ 9$

$73000)557379\ \ 0\ \ 0$

Interest, $£7\ \ 12\ \ 8\frac{1}{4}\ \frac{1671}{1825}$

15.

£ s. d.

$653\ \ 6\ \ 8$

58

$37893\ \ 6\ \ 8$

$4\frac{3}{4} \times 2 =\ \ 9\frac{1}{2}$

$73000)359986\ \ 13\ \ 4$

Interest, $£4\ \ 18\ \ 7\frac{1}{2}\ \frac{26}{365}$

16.

£ s. d.

$780\ \ 0\ \ 0$

257

$200460\ \ 0\ \ 0$

$3\frac{3}{4} \times 2 =\ \ 7\frac{1}{2}$

$73000)1503450\ \ 0\ \ 0$

Int., $£20\ \ 11\ \ 10\frac{3}{4}\ \frac{29}{73}$

17.

£ s. d.

$584\ \ 0\ \ 0$

308

$179872\ \ 0\ \ 0$

$3\frac{3}{8} \times 2 =\ \ 6\frac{3}{4}$

$73000)1214136\ \ 0\ \ 0$

Int., $£16\ \ 12\ \ 7\frac{1}{2}\ \frac{1314}{1825}$

	£	s.	d.
18.	256	0	0
			97
	24832	0	0
$4\frac{1}{2} \times 2 =$			9
73000)223488		0	0
Int.,	£3	1	$2\frac{3}{4}\ \frac{37}{1825}$

	£	s.	d.
19.	154	0	0
			197
	30338	0	0
$4\frac{5}{8} \times 2 =$			$9\frac{1}{4}$
73000)280626		10	0
Int.,	£3	16	$10\frac{1}{2}\ \frac{786}{1825}$

	£	s.	d.
20.	630	0	0
			129
	81270	0	0
$4\frac{1}{4} \times 2 =$			$8\frac{1}{2}$
73000)690795		0	0
Int.,	£9	9	$3\frac{39}{365}$

	£	s.	d.
21.	740	0	0
			126
	93240	0	0
$3\frac{7}{12} \times 2 =$			$7\frac{1}{6}$
73000)668220		0	0
Int.,	£9	3	$0\frac{3}{4}\ \frac{201}{365}$

	£	s.	d.
22.	230	0	0
			176
	40480	0	0
$3\frac{5}{12} \times 2 = 6\frac{5}{6} =$			$7-\frac{1}{6}$
73000)276613		6	8
Int.,	£3	15	$9\frac{1}{4}\ \frac{239}{365}$

	£	s.	d.
23.	789	0	0
			36
7300)28404		0	0
Int.,	3	17	$9\frac{3}{4}\ \frac{117}{365}$
Prin.,	789	0	0
Amt.,	£792	17	$9\frac{3}{4}\ \frac{117}{365}$

	£	s.	d.
24.	910	15	0
			27
7300)24590		5	0
Int.,	3	7	$4\frac{1}{4}\ \frac{287}{365}$
Prin.,	910	15	0
Amt.,	£914	2	$4\frac{1}{4}\ \frac{287}{365}$

	£	s.	d.
25.	874	0	0
			68
7300)59432		0	0
Int.,	8	2	$9\frac{3}{4}\ \frac{261}{365}$
Prin.,	874	0	0
Amt.,	£882	2	$9\frac{3}{4}\ \frac{261}{365}$

	£	s.	d.
26.	608	6	8
			58
	35283	6	8
$4 \times 2 =$			8
73000)282266		13	4
Int.,	3	17	4
Prin.,	608	6	8
Amt.,	£612	4	0

	£	s.	d.
27.	780	0	0
			257×6
73000)1202760		0	0
Int.,	16	9	$6\frac{1}{4}\ \frac{43}{365}$
Prin.,	780	0	0
Amt.,	£796	9	$6\frac{1}{4}\ \frac{43}{365}$

28.	£	s.	d.
	850	0	0
			308
	261800	0	0
$4\frac{1}{2}\times 2=$			9
73000)	2356200	0	0
Int.,	32	5	$6\frac{1}{4}\ \frac{47}{73}$
Prin.,	850	0	0
Amt.,	£882	5	$6\frac{1}{4}\ \frac{47}{73}$

29.	£	s.	d.
	260	0	0
			128
	33280	0	0
$4\times 2=$			8
73000)	266240	0	0
Int.,	3	12	$11\frac{1}{4}\ \frac{87}{365}$
Prin.,	260	0	0
Amt.,	£263	12	$11\frac{1}{4}\ \frac{87}{365}$

30.	£	s.	d.
	150	0	0
			228
	34200	0	0
$4\frac{3}{4}\times 2=$			$9\frac{1}{2}$
73000)	324900	0	0
Int.,	4	9	$0\frac{48}{73}$
Prin.,	150	0	0
Amt.,	£154	9	$0\frac{48}{73}$

31.	£	s.	d.
	630	0	0
			137
	86310	0	0
$4\frac{1}{4}\times 2=$			$8\frac{1}{2}$
73000)	733635	0	0
Int.,	10	0	$11\frac{3}{4}\ \frac{293}{365}$
Prin.,	630	0	0
Amt.,	£640	0	$11\frac{3}{4}\ \frac{293}{365}$

32.	£	s.	d.
	720	0	0
			91
	65520	0	0
$3\times 2=$			6
73000)	393120	0	0
Int.,	5	7	$8\frac{1}{4}\ \frac{291}{365}$
Prin.,	720	0	0
Amt.,	£725	7	$8\frac{1}{4}\ \frac{291}{365}$

33.	£	s.	d.
	230	0	0
			114
	26220	0	0
$3\frac{1}{2}\times 2=$			7
73000)	183540	0	0
Int.,	2	10	$3\frac{1}{4}\ \frac{247}{365}$
Prin.,	230	0	0
Amt.,	£232	10	$3\frac{1}{4}\ \frac{247}{365}$

34. £854 × 42

35868 × $7\frac{1}{4}$

269010

80703

188307

£3·685437=£3, 13s. $8\frac{1}{2}$d.

—3685437

+3685437

Int., £3, 13s. $8\frac{1}{4}$d. $\frac{343}{365}$

35. £1248·8 × 77

96157·6 × 7

673103·2

201930·96

47117·224

9·22151384

—922151384

+92215, etc.

£9·2206=£9, 4s. $4\frac{3}{4}$d.

Int., £9, 4s. $4\frac{3}{4}$d. $\frac{7008}{9125}$

36.

£750
19
14250
7
99750
$8\frac{1}{2}$
798000
49875
847875
2543625
5935125
11·6158875
—11615
£11·6147260
Int., £11, 12s. $3\frac{1}{2}$d. $\frac{10}{73}$

37.

£896
$3\frac{3}{8}$
2688
$\frac{2}{8}$ = 224
$\frac{1}{8}$ = 112
3024
$4\frac{5}{8}$
12096
$\frac{4}{8}$ = 1512
$\frac{1}{8}$ = 378
100) 13986
Int., £139, 17s. $2\frac{1}{4}$d. $\frac{3}{5}$

CASE III.

38.

Dates.	Due.	Ds.	Prod.
May 7.	£456	42	19152
June 18.	120		
Bal.	336	101	33936
Sept. 27.	116		
Bal.	220	51	11220
Nov. 17.	136		
Bal.	84	40	3360
Dec. 27.	84		

67668
9
73000)609012
Int., £8, 6s. $10\frac{0}{4}$d. $\frac{1688}{1825}$

39.

Dates.	Due.	Ds.	Prod.
Mar. 13.	£1000	25	25000
Apr. 7.	300		
Bal.	700	36	25200
May 13.	234		
Bal.	466	76	35416
July 28.	230		
Bal.	236	82	19352
Oct. 18.	236		

104968
$9\frac{1}{2}$
73000)997196
Int., £13, 13s. $2\frac{1}{4}$d. $\frac{1479}{1825}$

40.

Dates.	Due.	Ds.	Prod.
Jan. 1.	£900	58	52200
Feb. 28.	150		
Bal.	750	30	22500
Mar. 30.	270		
Bal.	480	81	38880
June 19.	173		
Bal.	307	39	11973
July 28.	213		
Bal.	94	57	5358
Sept. 23.	57		
Bal.	37	55	2035
Nov. 17.	37		

$7\frac{1}{2}$ × 132946

73000)997095

Int., £13, 13s. 2$\frac{0}{4}$d. $\frac{176}{365}$

41.

Dates.	Due.	Ds.	Prod.
Mar. 20.	£1000	181	181000
Sept. 17.	300		
Bal.	700	95	66500
Dec. 21.	150		
Bal.	550	64	35200
Feb. 23.	220		
Bal.	330	150	49500
July 23.	330		

332200

8

73000)2657600

Int., £36, 8s. 1$\frac{1}{4}$d. $\frac{19}{73}$
Bal., 330 0 0
Due, £366, 8s. 1$\frac{1}{4}$d. $\frac{19}{73}$

42.

Dates.		Due.		Days.		Products.
Jan. 20.	Due	£2000	×	77	=	154000
April 7.	Received	350				
	Bal.	1650	×	174	=	287100
Sept. 28.	Received	690				
	Bal.	960	×	81	=	77760
Dec. 18.	Received	420				
	Bal.	540	×	110	=	59400
Apr. 7.	Received	540				

$8\frac{2}{3}$ × 578260

73000)5011586$\frac{2}{3}$

Int., £68, 13s. 0$\frac{1}{4}$d. $\frac{291}{365}$
Bal., 540 0 0
Due, £608, 13s. 0$\frac{1}{4}$d. $\frac{291}{365}$

ACCOUNTS-CURRENT.—CASE IV.

43.

Dates.		£	Da.	*Dr.* prod.
Jan. 7.	Dr.	210	59	12390
Mar. 7.	Dr.	150		
	Dr.	360	38	13680
Apr. 14.	Cr.	130		
	Dr.	230	24	5520
May 8.	Dr.	240		
	Dr.	470	50	23500
June 27.	Cr.	215		
	Dr.	255	24	6120
July 21.	Dr.	300		
	Dr.	555	23	12765
Aug. 13.	Cr.	167		
	Dr.	388	36	13968
Sept. 18.	Dr.	250		
	Dr.	638	24	15312
Oct. 12.	Cr.	280		
	Dr.	358	37	13246
Nov. 18.	Cr.	120		
	Dr.	238	36	8568
Dec. 24.	Dr.	160		

7300)125069

Interest, £17, 2s. $7\frac{3}{4}$d. $\frac{157}{365}$

44.

Dates.		£	Da.	*Dr.* prod.
May 1.	Dr.	250	38	9500
June 8.	Cr.	124		
	Dr.	126	20	2520
June 28.	Dr.	140		
	Dr.	266	21	5586
July 19.	Cr.	230		
	Dr.	36	23	828
Aug. 11.	Dr.	340		
	Dr.	376	70	26320
Oct. 20.	Cr.	150		
	Dr.	226	23	5198
Nov. 12.	Dr.	221		
	Dr.	447	30	13410
Dec. 12.	Cr.	200		
	Dr.	247		

63362
8
73000)506896

Int., £6, 18s. $10\frac{1}{2}$d. $\frac{54}{1825}$

45.

Dates.		£	Da	*Dr.* pr.	*Cr.* pr.
Dec. 7.	Dr	103	68	7004	
Fe. 13.	Dr	118			
	Dr	221	28	6188	
Ma.13.	Cr	354			
	Cr	133	46		6118
Ap.28.	Dr	400			
	Dr	267	36	9612	
Jun. 3.	Cr	275			
	Cr	8	75		600
Au.17.	Cr	100			
	Cr	108	19		2052
Sep. 5.	Dr	350			
	Dr	242	74	17908	
No.18.	Cr	255			
	Cr	13	12		156
No.30.	Dr	13			
				40712	8926
				8	10
				325696	89260
				89260	
				73000)236436	

Int. £3, 4s. $9\frac{1}{4}$d. $\frac{539}{1825}$ due R.S.

46.

Dates.		£	Da	*Dr.* pr.	*Cr.* pr
Jun. 8.	Dr	107	47	5029	
Jul.25.	Dr	230			
	Dr	337	13	4381	
Aug.7.	Cr	400			
	Cr	63	31		1953
Sep. 7.	Dr	321			
	Dr	258	26	6708	
Oct. 3.	Cr	220			
	Dr	38	49	1862	
No.21.	Dr	161			
	Dr	199	32	6368	
De.23.	Dr	140			
	Dr	339	4	1356	
De.27.	Cr	180			
	Dr	159	56	8904	
Fe. 21.	Cr	159			
				34608	1953
				9	$7\frac{1}{2}$
				311472	$14647\frac{1}{2}$
				$14647\frac{1}{2}$	
				73000)$296824\frac{1}{2}$	

Due to T. M. £4, 1s. $3\frac{3}{4}$d. $\frac{813}{1825}$

Note.—The difference between the Dr. and Cr. sides of the Account should agree with the last balance; thus, in question 45,—

The Cr. side amounts to	£984
And the Dr. side	971
The difference is the Balance =	£13

Also, the sum of the days as found (358) should agree with the number of days from December 7 to November 30.

47.

Dates.		£	Days.	*Dr.* Prod.	*Cr.* Prod.
March 8.	Dr.	80	102	8160	
June 18.	Cr.	172			
	Cr.	92	16		1472
July 4.	Dr.	74			
	Cr.	18	81		1458
Sept. 23.	Cr.	98			
	Cr.	116	36		4176
Oct. 29.	Dr.	108			
	Cr.	8	17		136
Nov. 15.	Cr.	148			
	Cr.	156	32		4992
Dec. 17.	Dr.	217			
	Dr.	61	32	1952	
Jan. 18.	Dr.	135			
	Dr.	196	41	8036	
Feb. 28.	Cr.	150			
	Dr.	46	61	2806	
April 30.	Cr.	46			
				20954	12234
				$7\frac{1}{2}$	10
				157155	122340
				122340	

73000)34815

Int. due to R. C., £0, 9s. $6\frac{1}{4}$d. $\frac{307}{365}$

48.
£325, 7s. 6d. : £100 : : 1 ye.
£4 : £43, 7s. 8d.
78090d. £100
£4 10412d.
3 3)10
$3\frac{1}{3}$ y.

49. £$2\frac{1}{2}$: £$64\frac{1}{6}$: : 1 ye.
£$466\frac{4}{6}$: £100
5 385
2800 200
2 2)11
$5\frac{1}{2}$ ye.

50.
£$522\frac{7}{8}$: £100 : : £43, 11s. $5\frac{1}{2}$d.
Ye. $3\frac{1}{3}$ 1 41830 qr.
4183 800
10 3
£2, 10s. = 2400 qr. per cent.

51.
£2 : £100 : : 1 ye. : 50 ye.
£$2\frac{1}{2}$: £100 : : 1 ye. : 40 ye.
£3 : £100 : : 1 ye. : $33\frac{1}{3}$ ye.
£5 : £100 : : 1 ye. : 20 ye.
£$6\frac{2}{3}$: £100 : : 1 ye. : 15 ye.

52.
20ye. : 1ye. : : £200 : £10p.c.
25ye. : 1ye. : : £200 : £8p.c.
$33\frac{1}{3}$y. : 1ye. : : £200 : £6p.c.
50ye. : 1ye. : : £200 : £4p.c.
75ye. : 1ye. : : £200 : £$2\frac{2}{3}$p.c.

53.
£$533\frac{1}{3}$: £100 : : £9·6
Da. 219 : 365 ·6
1600 300
219 365
1 5 × ·6
£3 per cent.

54.
Int. on £100 for 5ye. = £$12\frac{1}{2}$
Amt. of 〃 〃 = £$112\frac{1}{2}$
Hence,
£112·5 : £477·9375 : £100
112·5)47793·75
£424, 16s. 8d. = £424·8$\dot{3}$

DISCOUNT.

1. £5 × $\frac{146}{365}$ = £2, int. p. c.
for 146 da.; then,
£102 : £100 : : £350
102)35000
Pres. val., £343, 2s. $8\frac{3}{4}$d. $\frac{13}{17}$

2. £5 × $\frac{2}{12}$ = £$\frac{5}{6}$ int., p. c.
for 2 mo.; then,
£$100\frac{5}{6}$: £100 : : £225
605 600 × 225
605)135000
Pres. val. £223, 2s. $9\frac{1}{2}$d. $\frac{106}{121}$

3. £5 × $\frac{73}{365}$ = £1 int. p.c.
for 73 da.; then,
£101 : £100 : : £212·5
101)21250
Pres. val., £210, 7s. 11$\frac{5}{101}$d.

4. £3$\frac{1}{3}$ × 3 = £10 int. p. c.
for 3 ye.; then,
£11,0 : £10,0 : : £352, 12s. 10d.
11)£3526, 8s. 4d.
Pres. val., £320, 11s. 8d.

5. £2$\frac{1}{2}$ × 3$\frac{1}{5}$ = £8 int. p. c.
for 3$\frac{1}{5}$ ye.; then,
£108 : £100 : : £496, 5s. 6d.
3 100 × £13, 15s. 8$\frac{1}{2}$d.
3)£1378, 10s. 10d.
Pres. val., £459, 10s. 3$\frac{1}{4}$d. $\frac{1}{3}$

6. £5 × $\frac{55}{365}$ = £$\frac{55}{73}$ int. p.c.
for 55 da.; then,
£100$\frac{55}{73}$: £$\frac{55}{73}$: : £410
7355 55
1471 11 × 410
1471)4510
Disct., £3, 1s. 3$\frac{3}{4}$d. $\frac{447}{1471}$

7. £5 × $\frac{4}{12}$ = £1$\frac{2}{3}$ int. p.c.
for 4 mo.; then,
£101$\frac{2}{3}$: £1$\frac{2}{3}$: : £150
305 5 × 30 30
61 61)150
Disct., £2, 9s. 2$\frac{10}{61}$d.

8. £4 × $\frac{125}{365}$ = £1$\frac{27}{73}$ int.
p. c. for 125 da.; then,
£ s. d.
£101$\frac{27}{73}$: £1$\frac{27}{73}$: : 334 7 9
74,00 1,00 4 10 4$\frac{1}{2}$
Disct., £4, 10s. 4$\frac{1}{2}$d.

9. £2$\frac{1}{2}$ × $\frac{79}{365}$ = £$\frac{79}{146}$ int.
p. c. for 79 da.; then,
£ s. d.
£100$\frac{79}{146}$: £$\frac{79}{146}$: : 1926 12 4$\frac{1}{4}$
14679 79 0 2 7$\frac{1}{2}$
79
Discount, £10, 7s. 4$\frac{1}{2}$d.

10. £3$\frac{1}{2}$ × 4 = £14 int. p. c.
for 4 ye.; then,
£114 : £14 : : £1000, 7s. 0d.
14 × £8, 15s. 6d.
Disct., £122, 17s. 0d.

11.
£65 — £5 = £60 present
value; then,
£60 : £100 : : £5
Mo. 4 : 12
1 5 × 5
25 per cent.

12. £393, 1s. 10d.
365, 13 4
Int., £27, 8s. 6d.

then, £365$\frac{2}{3}$: £100 : 1 ye.
£3 : £27·425
1097)2742·5
2·5 ye.

13. £573, 16s. 8d.
65
7300)37299 3 4
Disct., £5, 2s. 2¼d. $\frac{7}{73}$
Net pro., £568, 14s. 5½d. $\frac{66}{73}$

14. £478, 14s. 0d.
9 × 47
7300)202490 2 0
Disct., £2, 15s. 5½d. $\frac{8062}{9125}$
Net pr., £475, 18s. 6¼d. $\frac{1063}{9125}$

15. £237, 12s. 0d.
66 × 7½
73000)117612 0 0
Disct. £1, 12s. 2½d. $\frac{1238}{1825}$
Net. pr., £235, 19s. 9¼d. $\frac{587}{1825}$

16. £348, 0s. 0d.
86
7300)29928 0 0
Disct., £4, 1s. 11¾d. $\frac{269}{365}$
Com., 1 14 9½ $\frac{2}{5}$
Net pr., £342, 3s. 2¼d. $\frac{315}{365}$

17. £579, 0s. 0d.
82
7300)47478 0 0
Disct., £6, 10s. 0¾d. $\frac{249}{365}$
Net pr., £572, 9s. 11$\frac{0}{4}$d. $\frac{116}{365}$

18.
£450 × 89 = 40050
346½ × 106 = 36729
196 × 80 = 15680
268 × 48 = 12864
7300)105323
Disct., £14, 8s. 6½d. $\frac{254}{365}$
Com., 6 6 0½d. $\frac{146}{365}$
£20, 14s. 7½d. $\frac{7}{73}$
Net pro., £1239, 15s. 4½d. $\frac{66}{73}$

OR,

Dis. on I. M. = £5, 9s. 9d.
on A. B. 5 0 7½
on D. E. 2 2 11½
on H. L. 1 15 2¾
Discount, £14, 8s. 6¾d.
Commission, 6 6 0½d.
£20, 14s. 7¼d.

STOCKS.

1.
£104, 5s. : £1640, 4s. :: £100
2085s. 32804s. 20
417 236×20
3 3)4720
Stock, £1573, 6s. 8d.

2. £100 : £3420 :: £243
100)831060
Value, £8310, 12s.

3.
£152·5 : £1822·375 :: £100
152·5)182237·5
Stock, £1195

4. £10,0 : £126,0 :: £65·375
10)8237·25
Value, £823·725

5. £ s. £ s. d. £
242 10 : 1058 18 4 :: 10
58200d. 254140×10
58200)2541400
Income, £43, 13s. 4d.

6\.
£ £ £ £ s. d.
88$\frac{3}{8}$: 100 :: 3 : 3 7 10$\frac{503}{707}$
244 : 100 :: 10 : 4 1 11 $\frac{37}{61}$
104$\frac{1}{4}$: 100 :: 5 : 4 15 11$\frac{11}{139}$

7\.
£135 : £926, 2s. :: £8$\frac{3}{4}$
540 cr. £8, 11s. 6d. 35 cr.
108 7 7
Inc., £60, 0s. 6d.

8\.
£100 : £476, 7s. 6d. :: £92$\frac{5}{8}$
800 h. cr. 741 741 h. cr.
800)£352993, 17s. 6d.
Value, £441, 4s. 10$\frac{13}{80}$d.

9\.
£4 : £5 : £100 : £125 p. c.

10\.
£263$\frac{1}{4}$: £6396, 19s. 6d. :: £10
1053 25587 18 0×10
1053)255879 0 0
£243 per cent.

11\.
£88$\frac{3}{8}$: £88$\frac{7}{8}$ :: £2297, 15s.
707 711 45955s.
65 65
46215s.=£2310, 15s.
2297 15
Gain, £13, 0s.

12\.
£103·875 : £3365·55 :: £5
103·875)16827·75
1st inc. £162

Again,
£103$\frac{7}{8}$: £104$\frac{1}{8}$ :: £3365, 11s.
£243 : £10 67311s.
831 833
243 10
3)8330
2,0)277, 6s. 8d.
2d inc. £138, 16s. 8d.
1st ″ 162 0 0
Loss, £23, 3s. 4d.

13\.
£103 : £530, 9s. :: £10,0
206,0s. 10609s. 5
103 103×5
£515×21
Stock, £10815

14\.
£2153·3 : £2162·45 :: £88$\frac{1}{4}$
8613·2 353 353
)763344·85
£88·625 p. c.

15\.
£100 : £3753$\frac{1}{3}$: £3 :: £112·6
then, £274·6 — £112·6
= £162; hence,
£5 : £162 :: £104$\frac{1}{8}$
40 833
162
40)134946
Sterling, £3373, 13s

16. $£243\frac{7}{8} : £500 :: £100$
1951　4000 × 100
1951)400000
Stock, $£205$, 0s. $5\frac{1}{2}$d. $\frac{278}{1951}$

17.
$1-(\frac{1}{4}+\frac{1}{5}+\frac{1}{6})=1-\frac{37}{60}=\frac{23}{60}$
$\frac{23}{60}=£2300$ ∴ whole$=£6000$
then,
£100 : £1500 : £3 : £45
100 : 1200 : 5 : 60
100 : 1000 : 10 : 100
100 : 2300 : 8 : 184
Whole income, £389

18. £105 : £100 :: £4
21　20 × 4
21)80
Per cent., £3, 16s. $2\frac{1}{4}$d. $\frac{1}{7}$

19.
£3040, 4s. : £3075 7s. 9d. :: £108
729648d.　738093d.
4　4)437
Rate, $109\frac{1}{4}$ p. c.

20. $£87\frac{4}{8} : £4134\frac{3}{8} :: £3$
700　33075
4　189 × 3
4)567
1st income, £141, 15s.

Again, $£87\frac{4}{8} : £88\frac{5}{8} :: £4134\frac{3}{8}$
$£102\frac{4}{8}$: 4　33075
700　709　189
820　4
820　709 × 189
820)134001
2d income, . £163, 8s. $3\frac{3}{4}$d. $\frac{9}{41}$
1st income, . 141 15 0
Difference, . £21, 13s. $3\frac{3}{4}$d. $\frac{9}{41}$

EQUATION OF PAYMENTS.

1. 40 × £60 = 2400
60 × 80 = 4800
108 × 120 = 12960
260) 20160
Equated time, $77\frac{7}{13}$ days

2. 50 × £74 = 3700
250 × 108 = 27000
365 × 100 = 36500
282) 67200
Equated time, $238\frac{14}{47}$ days

3.

30 × £100 = 3000
118 × 270 = 31860
475 × 365 = 173375
735) 208235
Equated time, $283\frac{46}{147}$ days

4. 60 × £60 = 3600
96 × 80 = 7680
250 × 40 = 10000
400 × 60 = 24000
240) 45280
Equated time, $188\frac{2}{3}$ days

5. 35
90 × 21 = 1890
181 × 15 = 2715
278 × 34 = 9452
105) 14057
Equated time, $133\frac{92}{105}$ days

6.

s.	d.		£	s.	d.
14	6	× 7 =	5	1	6
15	0	× 8 =	6	0	0
15	6	× 10 =	7	15	0
16	0	× 12 =	9	12	0
16	6	× 15 =	12	7	6
17	6	× 17 =	14	17	6
18	0	× 18 =	16	4	0
		87)	71	17	6
Av., per gal.,			£0	16	$6\frac{1}{4}\frac{3}{29}$

7.

s.	d.		£	s.	d.
3	0	× 8 =	1	4	0
3	4	× 10 =	1	13	4
3	6	× 12 =	2	2	0
3	9	× 12 =	2	5	0
4	0	× 15 =	3	0	0
4	3	× 18 =	3	16	6
4	6	× 20 =	4	10	0
		95)	18	10	10
Av., per lb.,			£0	3	$10\frac{3}{4}\frac{7}{19}$

8.

£	s.	d.		£	s.	d.
2	0	0	× 20 =	40	0	0
2	0	3	× 25 =	50	6	3
2	0	6	× 30 =	60	15	0
2	1	6	× 35 =	72	12	6
2	2	3	× 40 =	84	10	0
2	3	6	× 45 =	97	17	6
2	4	0	× 50 =	110	0	0
			245)	516	1	3
Av. per qr.,				£2	2	$1\frac{1}{2}\frac{6}{49}$

9.

£	s.	d.		£	s.	d.
1	0	9	× 8 =	8	6	0
1	1	0	× 12 =	12	12	0
1	1	6	× 16 =	17	4	0
1	2	0	× 20 =	22	0	0
1	2	6	× 24 =	27	0	0
1	3	0	× 28 =	32	4	0
			108	119	6	0
			Gain,	6	15	6
			108)	126	1	6
S. P., per qr.,				£1	3	$4\frac{1}{6}$

10.

			£	s.	d.
3s.	2d.	× 7 =	£1,	2s.	2d.
3	4	× 14 =	2	6	8
3	6	× 21 =	3	13	6
3	8	× 28 =	5	2	8
4	0	× 35 =	7	0	0
		105	19	5	0
		Gain,	1	6	3
		105)	20	11	3
S. P., per lb.,			£0	3	11

11.
22 × 4 oz. = 88
21 × 6 = 126
18 × 8 = 144
15 × 10 = 150
12 × 12 = 144
9 × 14 = 126
54) 778
Av. fine., $14\frac{11}{27}$ carats

12.
30·000 in.
29·953
29·841
29·622
30·169
30·331
6)179·916
Av. pres., 29·986 in.

PROFIT AND LOSS.

1. 16s. 3d. — 14s. 8d. = 1s. 7d. gain per yd., and 1s. 7d. × 428 = £33, 17s. 8d. the whole gain.
2. $9\frac{3}{4}$d. × 112 = £4, 11s. S. P. per cwt., and £4, 11s. 0d. — £4, 3s. 6d. = 7s. 6d. gain per cwt.; hence, 7s. 6d. × 57 = £21, 7s. 6d. whole gain.
3. £12, 0s. 0d. ÷ 136 = 1s. $9\frac{3}{17}$d. gain per yd.; hence, 3s. 8d. + 1s. $9\frac{3}{17}$d. = 5s. $5\frac{3}{17}$d. S. P. per yd.
4. £9, 0s. 0d. ÷ 257 = $8\frac{1}{4}$d. $\frac{159}{257}$, loss per yd.; hence, 3s. 9d. + $8\frac{1}{4}$d. $\frac{159}{257}$ = 4s. $5\frac{1}{4}$d. $\frac{159}{257}$, B. P. per yd.
5. £11, 10s. ÷ 156 = 1s. $5\frac{1}{2}$d. $\frac{10}{13}$, gain per pair; hence, 3s. 7d. — 1s. $5\frac{1}{2}$d. $\frac{10}{13}$ = 2s. $1\frac{1}{4}$d. $\frac{3}{13}$, B. P. per pair.
6. 19s. — 17s. 6d. = 1s. 6d. gain per yd.; hence, $873\frac{1}{2}$s. ÷ $1\frac{1}{2}$s. = 582 yd. 1 qr. $1\frac{1}{3}$ nl.
7. 3s. 6d. × 112 = £19, 12s. S. P. per cwt., and £19, 12s. — £14, 10s. = £5, 2s. gain per cwt.; hence, £130 ÷ £5, 2s. = 25 cwt. 1 qr. $26\frac{46}{51}$ lb.
8. £4, 4s. ÷ 112 = 9d. B. P. per lb., and 9d. — $8\frac{1}{4}$d. = $\frac{3}{4}$d. loss per lb.; hence, £85 ÷ $\frac{3}{4}$d. = 27200 lb. = 242 cwt. 3 qr. 12 lb.
9. (3s. 10d.—3s. 5d.) × 236 = 5d. × 236 = £4, 18s. 4d. whole loss.
10. £14, 12s. ÷ (234 × 8) = $1\frac{3}{4}$d. $\frac{19}{39}$, loss per stone, and 4s. 8d. — $1\frac{3}{4}$d. $\frac{19}{39}$ = 4s. $6\frac{0}{4}$d. $\frac{20}{39}$, S. P. per stone; hence, 4s. $6\frac{0}{4}$d. $\frac{20}{39}$ ÷ 14 = $3\frac{3}{4}$d. $\frac{127}{273}$, S. P. per lb.

---

11. 44d. : 4d. : : £100 : $£9\frac{1}{11}$ gain per cent.
12. 15s. : $1\frac{1}{2}$s. : : £100 : £10 loss per cent.

13. $9\frac{1}{2}$s. : $2\frac{1}{2}$s. : : £100 : £$26\frac{6}{19}$ gain per cent.
14. 66d. : 9d. : : £100 : £$13\frac{7}{11}$ loss per cent.
15. $5\frac{3}{4}$d. : $3\frac{1}{4}$d. : : £100 : £$56\frac{12}{23}$ gain per cent.; then, 7 cwt. 3 qr., or, 868 lb. × $3\frac{1}{4}$d. = 2821d. = £11, 15s. 1d. whole gain.
16. 12d. : $2\frac{1}{2}$d : : £100 : £$20\frac{5}{6}$ gain per cent.
17. £335 : £65 : : £100 : £$19\frac{27}{67}$ gain per cent.

18. £100 : £$109\frac{1}{11}$: : 3s. 8d. : 4s. S. P.
19. £100 : £90 : : 15s. : 13s. 6d. S. P.
20. £100 : £$126\frac{6}{19}$: : 9s. 6d. : 12s. S. P.
21. £100 : £$86\frac{4}{11}$: : $5\frac{1}{2}$s. : 4s. 9d. S. P.
22. £100 : £$156\frac{12}{23}$: : $5\frac{3}{4}$d. : 9d. S. P.
23. £100 : £$120\frac{5}{6}$: : 4s. : 4s. 10d. S. P.

24. £$109\frac{1}{11}$: £100. : : 4s. : 3s. 8d. B. P.
25. £90 : £100 : : $13\frac{1}{2}$s. : 15s. B. P.
26. £$86\frac{4}{11}$: £100 : : $4\frac{3}{4}$s. : 5s. 6d. B. P.
27. £$156\frac{12}{23}$: £100 : : 9d. : $5\frac{3}{4}$d. B. P.
28. £$120\frac{5}{6}$: £100 : : 4s. 10d. : 4s. B. P.
29. £$126\frac{6}{19}$: £100 : : 12s. : 9s. 6d. B. P.

30. 5s. : 6s. : : £112 : £$134\frac{2}{5}$; then, £$134\frac{2}{5}$ — £100 = £$34\frac{2}{5}$ gain per cent.
31. 8s. : $7\frac{1}{2}$s. : : £86 : £$80\frac{5}{8}$; then, £100 — £$80\frac{5}{8}$ = £$19\frac{3}{8}$ loss per cent.
32. $15\frac{1}{2}$s. : $16\frac{1}{3}$s. : : £118 : £$124\frac{32}{93}$; then, £$124\frac{32}{93}$ — £100 = £$24\frac{32}{93}$ gain per cent.
33. $5\frac{1}{4}$s. : $4\frac{1}{2}$s. : : £116 : £$99\frac{3}{7}$; then, £100—£$99\frac{3}{7}$ = £$\frac{4}{7}$ loss per cent.

34. £5 : £100 : : £44, 16s. : £896, B. P.
35. £4 : £100 : : £34, 18s. : £872, 10s. B. P., and £872, 10s. + £34, 18s. = £907, 8s. S. P.
36. £3 : £100 : : £53, 14s. : £1790 B. P., and £1790 ÷ 342 = £5, 4s. $8\frac{8}{57}$d. B. P. per cwt., also £1843, 14s. ÷ 342 = £5, 7s. $9\frac{3}{4}$d. $\frac{17}{57}$, S. P., per cwt.
37. £$4\frac{1}{2}$: £100 : : £29, 18s. : £$664\frac{4}{9}$ B. P., and £$664\frac{4}{9}$ ÷ $5\frac{2}{3}$s. = $2345\frac{5}{51}$ yards sold.

38. £6 : £106 : : £$33\frac{1}{3}$: £$588\frac{8}{9}$ S. P., and £$588\frac{8}{9}$ ÷ $7\frac{2}{3}$s. = $1536\frac{16}{69}$ lb. sold.

39. £3 : £19, 18s. 6d. : : £100 : £664, 3s. 4d. B. P., and £664, 3s. 4d. ÷ 386 = £1, 14s. $4\frac{3}{4}$d. $\frac{157}{193}$, B. P. per gal.; also, £644, 4s. 10d. ÷ 386 = £1, 13s. $4\frac{1}{2}$d. $\frac{50}{193}$, S. P. p. g.

PROMISCUOUS EXERCISES.

1. 5s. 8d. × $\frac{4}{5}$ = 4s. $6\frac{2}{5}$d., and ($54\frac{2}{5}$d. — 51d.) × 60 = 17s. gain, also 51d. : $3\frac{2}{5}$d. : : £100 : £$6\frac{2}{3}$ gain per cent.
2. $6\frac{1}{4}$s. × 4 = 25s. per cwt., and $38\frac{1}{2}$s. — 25s. = $13\frac{1}{2}$s. gain per cwt., then $13\frac{1}{2}$s. × 27 = £18, 4s. 6d. whole gain, also 25s. : $13\frac{1}{2}$s. : : £100 : £54 gain per cent.
3. 800d. ÷ 80 = 10d. gain per yd., then 15s. 10d. = S. P. per yd., and 180d. : 10d. : : £100 : £$5\frac{5}{9}$ gain p. c.
4. ($8\frac{1}{2}$s. × 252) ÷ (252 — 24) = 9s. $4\frac{1}{2}$d. $\frac{18}{19}$, S. P. per gal.
5. $9\frac{1}{2}$d. × 1988 = 18886d. S. P., and 18886d. — 11928d. = 6958d. or £28, 19s. 10d. whole gain, then 11928d. : 6958d. : : £100 : £$58\frac{1}{3}$ gain per cent.
6. £110 : £100 : : £$136\frac{2}{5}$: £124 B. P., and £124 ÷ 532 = 4s. $7\frac{3}{4}$d. $\frac{101}{133}$, B. P. per lb.
7. £100 : £115 : : 105s. : 120s. 9d. S. P. per cwt., and 120s. 9d. ÷ 112 = 1s. $0\frac{3}{4}$d. $\frac{3}{4}$, S. P. per lb.
8. $17\frac{1}{2}$s. : $18\frac{1}{4}$s. : : £108 : £$112\frac{22}{35}$ S. P. per cent., then £$112\frac{22}{35}$ — £100 = £$12\frac{22}{35}$ gain per cent.
9. £100 : £120 : : $8\frac{1}{2}$s. × 126 : $1285\frac{1}{5}$s. S. P., then $1285\frac{1}{5}$s. — ($10\frac{1}{6}$s. × 69) = $583\frac{7}{10}$s., and $583\frac{7}{10}$s. ÷ 57 = 10s. $2\frac{3}{4}$d. $\frac{51}{95}$, S. P. of rum per gal.
10. 2d. : $1\frac{3}{4}$d. : £110 : £$96\frac{1}{4}$ S. P. per cent., then £100 — £$96\frac{1}{4}$ = £$3\frac{3}{4}$ loss per cent.
11. 98406d. ÷ 11 = 8946d. gain, then 89460d. : 8946d. : : £100 : £10 gain per cent.
12. $\underline{\text{30 gu.} \times 11}$ + charges, $\underline{\frac{1}{9}\text{ gu.} \times 572}$ or $63\frac{5}{9}$ gu. = 393 g. 11s. 8d. = £413, 4s. 8d. whole cost; then, $\underline{16\frac{1}{6}\text{s.} \times 286}$ + $\underline{\text{17s.} \times 286}$ = £474, 5s. 8d. wh. return; hence, £474, 5s. 8d. — £413, 4s. 8d = £61, 1s. gain.
13. £$5\frac{1}{2}$ × 400 = £2200 B. P.; then, $10\frac{1}{4}$d. × 16000 bu. = £$683\frac{1}{3}$ duty; and £2200 + £25 + £60 + £$683\frac{1}{3}$ = £$2968\frac{1}{3}$, whole cost; again, $3\frac{5}{6}$s. × 16000 = £$3066\frac{2}{3}$, and £$3066\frac{2}{3}$ — £$2968\frac{1}{3}$ = £$98\frac{1}{3}$ gain; hence £$2968\frac{1}{3}$: £$98\frac{1}{3}$: : £100 : £$3\frac{557}{1781}$ gain per cent.

14. $\underline{78\frac{1}{2}\text{s.}\times 300}+\underline{2\frac{7}{12}\text{s.}\times 450}+\underline{16\text{s.}\times 1200}=£1177\frac{1}{2}+£58\frac{1}{8}+£960=£2195\frac{5}{8}$, value of the goods shipped; ∴ £2195, 12s. 6d. + £44, 8s. 6d. = £2240, 1s. gross value; then, £2440, 16s. 4d. — £2240, 1s. = £200, 15s. 4d. gain, and 44801s. : $4015\frac{1}{3}$s. : : £100 : £$8\frac{129376}{134403}$ gain per cent.

15 $\underline{39\frac{1}{2}\text{s.}\times 1200}+\underline{25\frac{1}{2}\text{s.}\times 600}+\underline{15\text{s.}\times 400}=£2370+£765+£300=£3435$, value of the goods shipped; then, £3435 + £56, 14s. + £3, 12s. + £18, 10s. = £3513, 16s. amount of the adventure; and £3618, 14s. 6d. — £3513, 16s. = £104, 18s. 6d. gain.

16. £$108\frac{1}{3}$: £100 : : $3\frac{1}{4}$s. : 3s. B. P. per yard, and £$8\frac{1}{3}$: £$108\frac{1}{3}$: : £12 : £156 S. P. in all; then, 3s. 3d. : £156 : : 1 yard : 960 yards.

17. $\frac{1}{3}$ of £5 = £$1\frac{2}{3}$ int. p. c. for 4 months; then, £$101\frac{2}{3}$: £100 : : $20\frac{1}{3}$s. : 20s. ready money S. P., and 15s. : 5s. : : £100 : £$33\frac{1}{3}$ gain per cent.

18. £100 : £110 : : 12s. : $13\frac{1}{5}$s. ready money S. P.; then, £100 : £$102\frac{1}{2}$: : $13\frac{1}{5}$s. : 13s. $6\frac{1}{4}$d. $\frac{11}{25}$, S. P.

19. £100 : £105 : : £25 : £$26\frac{1}{4}$, pres. val. of the tea, per cwt., then £$103\frac{1}{3}$: £100 : : $597\frac{1}{3}$s. : $578\frac{2}{31}$s. ready money S. P. per cwt.; therefore, $578\frac{2}{31}$s. — 525s. = $53\frac{2}{31}$s. gain; hence, £$26\frac{1}{4}$: £100 : : $53\frac{2}{31}$s. : $202\frac{14}{93}$s. or £$10\frac{10}{93}$ gain per cent.

20. £$107\frac{1}{2}$: £100 : : $10\frac{3}{4}$d. × 112 : £4, 13s. 4d. S. P. per cwt.

21. £100 × 112 : £$106\frac{5}{18}$: : £4·286 : $9\frac{3}{4}$d. $\frac{4559}{105000}$, S. P. per lb.

22. (£$11\frac{5}{6}\div 94\frac{2}{3}$) + £·784 = £·909 = 18s. $2\frac{1}{4}$d. nly. S. P. p. yd.

23. £$103\frac{3}{4}$: £100 : : 4s. 9d. : 4s. $6\frac{3}{4}$d. $\frac{66}{83}$, B. P. per yard.

24. $9\frac{1}{8}$d. : $10\frac{11}{12}$d. : : £$99\frac{1}{8}$: £118·5879, and £118·5879 — £100 = £18·5879 gain per cent.

25. £$101\frac{6}{7}$: £$108\frac{1}{2}$: : 3s. 9d. : 3s. $11\frac{3}{4}$d. $\frac{17}{23}$, S. P. per pair.

26. 1 lb. : 3 cwt. 1 qr. 17 lb. : : $\frac{17}{18}$s. : £$17{\cdot}991\dot{6}$ S. P. of whole, and £$17{\cdot}991\dot{6}$ — £$13{\cdot}3864\dot{3}$ = £$4{\cdot}6052\dot{3}$ gain; hence, £$13{\cdot}3864\dot{3}$: £$4{\cdot}6052\dot{3}$: : £100 : £34·4022 gain per cent.

27. £100 : £$101\frac{2}{3}$: : £1·6 × 350 : £$569{\cdot}\dot{3}$ pres. val.; then 100 : 97 : : 350 qr. : $339\frac{1}{2}$ qr. to be exchanged, and 5s. 6d. × $339\frac{1}{2}$ × 6 = £560, 3s. 6d. value received; hence £569, 6s. 8d. — £560, 3s. 6d. = £9, 3s. 2d. loss.

28. £95 : £100 : : £52, 5s. : £55 B. P. of 1st article, and £55 — £52, 5s. = £2, 15s. loss to be recovered by selling 2d article; hence, (£37, 15s. — £2, 15s.) : £2, 15s. : : £100 : £7$\frac{6}{7}$ gain per cent.

29. £101$\frac{2}{3}$: £100 : : £122 : £120 present value, and £120 — £100 = £20 gain per cent.

30. £100 : £105 : : £2475 : £2598·75 C paid, and £2598·75 —£2250=£348·75 C. paid above A.; hence £2250 : £348$\frac{3}{4}$: £100 : £15$\frac{1}{2}$ per cent. above B. P.

31. $\frac{3}{5}$d. : $\frac{1}{2}$d. : : £103 : £85$\frac{5}{6}$, and £100—£85$\frac{5}{6}$ = £14$\frac{1}{6}$ loss per cent.

DISTRIBUTIVE PROPORTION.

SIMPLE FELLOWSHIP.

1.
3+4+5=12 S. of propor.;
then, 12 : 3 : : 120 : 30
12 : 4 : : 120 : 40
12 : 5 : : 120 : 50
Proof, 120

2.
1+3+5=9 S. of propor.;
then, 9 : 1 : : 960 : 106$\frac{2}{3}$
9 : 3 : : 960 : 320
9 : 5 : : 960 : 533$\frac{1}{3}$
Proof, 960

3. £64 + £88 + £96 = £248 S. of propor.; then,
£248 : £64 : : £108 : £27, 17s. 5$\frac{1}{31}$d. A's share
248 : 88 : : 108 : 38 6 5$\frac{13}{31}$ B's 〃
248 : 96 : : 108 : 41 16 1$\frac{17}{31}$ C's 〃
Proof, £108, 0s. 0d.

4.
£540+£360+£240+£120=£1260 S. of propor.; then,
£1260 : £540 : : £220 : £94, 5s. 8$\frac{1}{2}$d. $\frac{2}{7}$ A's share
1260 : 360 : : 220 : 62 17 1$\frac{1}{2}$ $\frac{6}{7}$ B's 〃
1260 : 240 : : 220 : 41 18 1$\frac{0}{4}$ $\frac{4}{7}$ C's 〃
1260 : 120 : : 220 : 20 19 0$\frac{1}{2}$ $\frac{2}{7}$ D's 〃
Proof, £220, 0s. 0d.

5. £230 + £324 + £336 = £890 S. of propor.; then,
£890 : £230 : : £144 : £37, 4s. 3$\frac{0}{4}$d. $\frac{84}{89}$ M's loss
890 : 324 : : 144 : 52 8 5$\frac{1}{4}$ $\frac{51}{89}$ N's 〃
890 : 336 : : 144 : 54 7 3$\frac{1}{4}$ $\frac{43}{89}$ P's 〃
Proof, £144, 0s. 0d.

6. £940 + £560 + £840 = £2340 S. of propor.; then,

£2340 : £940 :: £240 : £96, 8s. $2\frac{1}{4}$d. $\frac{11}{13}$ B's loss
2340 : 560 :: 240 : 57 8 $8\frac{1}{2}$ $\frac{6}{13}$ C's 〃
2340 : 840 :: 240 : 86 3 $0\frac{3}{4}$ $\frac{9}{13}$ D's 〃
Proof, £240, 0s. 0d.

7. £40 + £64 + £56 = £160 S. of propor.; then,

£160 : £40 :: £1200 : £300 A's stock
160 : 64 :: 1200 : 480 B's 〃
160 : 56 :: 1200 : 420 C's 〃
Proof, £1200

8. £400 + £350 + £200 = £950 S. of propor.; then,

£950 : £400 :: 240 ac. : 101 ac. 0 ro. $8\frac{8}{19}$ L's share
950 : 350 :: 240 : 88 1 $27\frac{7}{19}$ M's 〃
950 : 200 :: 240 : 50 2 $4\frac{4}{19}$ N's 〃
Proof, 240 ac. 0 ro. 0 per.

9.
£750·6 + £800·8 + £840·4 + £900 + £960·9 + £1000·75 = £5253·45 sum of debts; hence £4377·875 ÷ 5253·45 = £$\cdot8\dot{3}$ = 16s. 8d. dividend per £1; then,

£750·6 × $\frac{5}{6}$ = £625·50 L rec.	£900·0 × $\frac{5}{6}$ = £750·0 O rec.
800·8 × $\frac{5}{6}$ = $667\cdot3\dot{3}$ M 〃	960·9 × $\frac{5}{6}$ = 800·75 P 〃
840·4 × $\frac{5}{6}$ = $700\cdot3\dot{3}$ N 〃	1000·75 × $\frac{5}{6}$ = $833\cdot958\dot{3}$ Q 〃
£$1993\cdot1\dot{6}$ +	£$2384\cdot708\dot{3}$

Proof, £4377·875

10.
840 + 900 + 960 + 1000 = 3700 men, S. of propor.; then,

3700 : 840 :: 555 men : 126 men 1st sends
3700 : 900 :: 555 〃 : 135 〃 2d 〃
3700 : 960 :: 555 〃 : 144 〃 3d 〃
3700 : 1000 :: 555 〃 : 150 〃 4th 〃
Proof, 555 men.

11.

Since $\frac{1}{2} \times 2$; $\frac{1}{3} \times 3$; $\frac{1}{4} \times 4$; $\frac{1}{5} \times 5$; and $\frac{1}{6} \times 6$, each $= 1$,
then $2+3+4+5+6 = 20$ sum of propor.; hence,
20 : 2 :: £840, 7s. 6d. : £84, 0s. 9d. share of 1st
20 : 3 :: 840 7 6 : 126 1 1½ 〃 2d
20 : 4 :: 840 7 6 : 168 1 6 〃 3d
20 : 5 :: 840 7 6 : 210 1 10½ 〃 4th
20 : 6 :: 840 7 6 : 252 2 3 〃 5th
Proof, £840, 7s. 6d.

12. $\frac{1}{3} + \frac{1}{4} + \frac{1}{6} = \frac{4+3+2}{12} = \frac{9}{2}$, S. of propor.; then,
9 : 4 :: £467, 18s. 6d. : £207, 19s. 4d. 1st share
9 : 3 :: 467 18 6 : 155 19 6 2d 〃
9 : 2 :: 467 18 6 : 103 19 8 3d 〃
Proof, £467, 18s. 6d.

13.

£46·725 : £724·2375 :: 1 lb. : 15 lb. 6 oz. of ster. gold; hence,
(22 + 2) : 22 :: 15 lb. 6 oz. : 14 lb. 2½ oz. pure gold
24 : 2 :: 15 6 : 1 3½ alloy
Proof, 15 lb. 6 oz.

14. 66s. : 1023s. :: 1 lb. : 15 lb. 6 oz. ster. silver; hence,
(37 + 3) : 37 :: 15 lb. 6 oz. : 14 lb. $4\frac{1}{20}$ oz. pure silver
40 : 3 :: 15 6 : 1 $1\frac{19}{20}$ alloy
Proof, 15 lb. 6 oz.

15.

74·8 + 13·3 + 11·9 = 100, sum of proportionals; then,
100 : 74·8 :: 17 cwt. 3 qr. 12 lb. : 13 cwt. 1 qr. 12 lb. nitre
100 : 13·3 :: 17 3 12 : 2 1 14 charcoal
100 : 11·9 :: 17 3 12 : 2 0 14 sulphur
Proof, 17 cwt. 3 qr. 12 lb.

16.

If B has 1 share, A has $\frac{2}{3}$ of a share, and C $\frac{5}{4}$ of a share;
hence, $\frac{2}{3}+1+\frac{5}{4} = \frac{8+12+15}{12} = \frac{35}{12}$, sum of propor.; then,
35 : 8 :: £266, 17s. 6d. : £61, 0s. 0d. A's share
35 : 12 :: 266 17 6 : 91 10 0 B's 〃
35 : 15 :: 266 17 6 : 114 7 6 C's 〃
Proof, £266, 17s. 6d.

COMPOUND FELLOWSHIP.

17.
£250×3+£960×2+£540×6=£5910 S. of propor.; then,
£5910 : £750 :: £480 : £60, 18s. $3\frac{1}{4}$d. $\frac{31}{197}$ A's share
5910 : 1920 :: 480 : 155 18 $9\frac{1}{4}$ $\frac{103}{197}$ B's 〃
5910 : 3240 :: 480 : 263 2 $11\frac{1}{4}$ $\frac{63}{197}$ C's 〃
Proof, £480, 0s. 0d.

18. £215×3+£310×5+£105×12=£3435 S. of propor.;
then, £3455 : £645 :: £254 : £47, 8s. $4\frac{1}{4}$d. $\frac{349}{691}$ A.'s sh.
3455 : 1550 :: 254 : 113 19 $0\frac{0}{4}$ $\frac{528}{691}$ B.'s 〃
3455 : 1260 :: 254 : 92 12 $7\frac{1}{4}$ $\frac{505}{691}$ C.'s 〃
Proof, £254, 0s. 0d.

19. £200×12+£160×12+£120×8=£5280 S. of propor.;
then, £5280 : £2400 :: £150 : £68, 3s. $7\frac{1}{2}$d. $\frac{6}{11}$ A.'s sh.
5280 : 1920 :: 150 : 54 10 $10\frac{3}{4}$ $\frac{7}{11}$ B.'s 〃
5280 : 960 :: 150 : 27 5 $5\frac{1}{4}$ $\frac{9}{11}$ C.'s 〃
Proof, £150, 0s. 0d.

20.
£600 × 8 + £400 × 4 = £6400 A's propor.
£400 × 6 + £600 × 6 = 6000 B's 〃
£300 × 4 + £700 × 6 + £500 × 2 = 6400 C's 〃
Sum of proportionals = £18800; then,
£18800 : £6400 :: £360 : £122, 11s. $0\frac{3}{4}$d. $\frac{3}{47}$ A's share
18800 : 6000 :: 360 : 114 17 $10\frac{1}{4}$ $\frac{41}{47}$ B's 〃
18800 : 6400 :: 360 : 122 11 $0\frac{3}{4}$ $\frac{3}{47}$ C's 〃
Proof, £360, 0s. 0d.

21. 40 ox.×4+60 ox.×3+20 ox.×5 = 440 S. of propor.;
then, 440 : 160 :: £30 : £10, 18s. $2\frac{2}{11}$d. A pays.
440 : 180 :: 30 : 12 5 $5\frac{6}{11}$ B 〃
440 : 100 :: 30 : 6 16 $4\frac{4}{11}$ C 〃
Proof, £30, 0s. 0d.

22.
£12÷30+£10÷40+£8÷25=£·4+£·25+£·32=£·97;
then, £·97 : £·4 :: 12 mo. : $4\frac{92}{97}$ mo. A's time
·97 : £·25 :: 12 : $3\frac{9}{97}$ B's 〃
·97 : £·32 :: 12 : $3\frac{93}{97}$ C's 〃
Proof. 12 months

23.
$\underline{£6000 \div 48} + \underline{£6400 \div 50} + \underline{£7000 \div 56} + \underline{£7560 \div 60} =$
125 + 128 + 125 + 126 = 504 S. of propor.; hence,
504 : 125 : : 595ac.1ro.16per.: 147ac.2ro.25per. 1st recd.
504 : 128 : : 595 1 16 : 151 0 32 2d 〃
504 : 125 : : 595 1 16 : 147 2 25 3d 〃
504 : 126 : : 595 1 16 : 148 3 14 4th 〃
Proof, $\overline{\text{595ac.1ro.16per.}}$

24. $\underline{28 \times 6} + \underline{24 \times 4} + \underline{20 \times 3} + \underline{15 \times 2} = 354$ S. of propor.;
then, 354 : 168 : : 3894 rounds : 1848 rounds, 1st battery
354 : 96 : : 3894 〃 : 1056 〃 2d 〃
354 : 60 : : 3894 〃 : 660 〃 3d 〃
354 : 30 : : 3894 〃 : 330 〃 4th 〃
Proof, $\overline{3894}$ rounds

25. £45, 3s. — £18, 18s. = £26, 5s., B. paid; then,
(£18, 18s. ÷ 3) : (£26, 5s. ÷ 5) : : 6 ox. : 5 oxen of B.

26. £210, 16s. 8d. ÷ 5 = £42, 3s. 4d. A's gain in 1 mo.
221 7 6 ÷ 6 = 36 17 11 B's 〃
177 2 0 ÷ 7 = 25 6 0 C's 〃
151 16 0 ÷ 8 = 18 19 6 D's 〃

then, £42, 3s. 4d. : £36, 17s. 11d. : : £4000 : £3500 B's st.
42 3 4 : 25 6 0 : : 4000 : 2400 C's 〃
42 3 4 : 18 19 6 : : 4000 : 1800 D's 〃

EXCHANGE.

1. £1 : £47·925 : : 10·36 fl. : 496·503 fl.
£1 : £99·625 : : 10·36 fl. : 1032·115 fl.

2. 6 lire : 500$\frac{1}{2}$ lire : : 48$\frac{1}{6}$d. : $\frac{1001 \times 289}{12 \times 6}$d. = $\frac{289289}{72}$d. =
4017$\frac{3}{4}$d. $\frac{11}{18}$ = £16, 14s. 9$\frac{3}{4}$d. $\frac{11}{18}$
6 lire : 500$\frac{1}{2}$ lire : : 48$\frac{3}{4}$d. : $\frac{1001 \times 195}{12}$qr. = $\frac{195195}{12}$qr. =
16266$\frac{1}{4}$ qr. = £16, 18s. 10$\frac{1}{2}$d. $\frac{1}{4}$

600 ct. : 784934 ct. : : 48$\frac{1}{6}$d. : $\frac{784934 \times 289}{600 \times 6}$d. = $\frac{226845926}{3600}$d. =
63012$\frac{3}{4}$d. $\frac{13}{450}$ = £262, 11s. 0$\frac{3}{4}$d. $\frac{13}{450}$

600 ct. : 784934 ct. : : 195 qr. : $\frac{392467\times13}{20}$ qr. $=\frac{5102071}{20}$ qr. $=$ 255103$\frac{11}{20}$ qr. $=$ £265, 14s. 7$\frac{3}{4}$d. $\frac{11}{20}$

3. £1 : £375·725 : : 25·22 fr. : 9475·7845 fr.
£1 : £508·875 : : 25·22 fr. : 12833·8275 fr.

4.
£ s. d.
£100 : 796 19 7$\frac{1}{2}$: : £120 cur.
5 6 6
5)4781 17 9
£956, 7s. 6$\frac{1}{2}$d. $\frac{2}{5}$ cur.

£ s. d.
£100 : 1549 18 9 : : £120 cur.
5 6 6
5)9299 12 6
£1859, 18s. 6d. cur.

5.
£ s. d.
£1 : 1587 8 6$\frac{1}{2}$: : 9 r.d. 10 sk.
480h.d. 761965h.d. 874 sk.
48 152393 × 437
48)66595741
96)1387411$\frac{13}{48}$ sk.
14452r.d. 19$\frac{13}{48}$sk.

480h.d. : 761965h.d. : : 9$\frac{1}{6}$r.d.
96 152393×9$\frac{1}{6}$
96)1396935$\frac{5}{6}$
14551r.d. 39$\frac{5}{6}$ sk.

£ s. d.
£1 : 2479 8 11$\frac{3}{4}$: : 9r.d. 10sk.
960qr. 2380271qr. 874 sk.
480 437 437
480)1040178427
96)2167038$\frac{187}{480}$ sk.
22573 r. d. 30$\frac{187}{480}$

5.
960qr. : 2380271qr. : : 9$\frac{1}{6}$r.d.
192 2—$\frac{1}{6}$ 1$\frac{5}{6}$
192)4363830$\frac{1}{6}$
22728r.d. 27$\frac{1}{12}$sk.

6.
441h.sch. : 79380h.sch. : : £1
125 : 100
441 15876×4
441)63504
£144

437h.sch. : 79380h.sch. : : £1
125 : 100
437 15876×4
437)63504
£145, 6s. 4$\frac{1}{4}$d. $\frac{155}{437}$

882 qr.sc. : 267443qr.sc. : : £1
125 : 100
441×5 267443×2
2205) 534886
£242, 11s. 6$\frac{3}{4}$d. $\frac{79}{147}$

874 qr.sc. : 267443qr.sc. : : £1
125 : 100
437×5 267443×2
2185) 534886
£244, 15s. 11$\frac{3}{4}$d. $\frac{53}{437}$

7. 1225 cts. : 748040 cts. : : £1 : £610, 12s. $10\frac{3}{4}$d. $\frac{5}{49}$
1205 cts. : 748040 cts. : : £1 : £620, 15s. $7\frac{0}{4}$d. $\frac{212}{241}$
1225 cts. : 974955 cts. : : £1 : £795, 17s. $7\frac{1}{2}$d. $\frac{13}{49}$
1205 cts. : 974955 cts. : : £1 : £809, 1s. $9\frac{3}{4}$d. $\frac{153}{241}$

8. 1 s. r. : 70580 s. r. 12 an. 7 pi. : : 2s. $0\frac{1}{4}$d.
192 pice 13551511 pice × 97 qr.
192)1314496567
£7131, 12s. $0\frac{55}{768}$d. = $6846336\frac{55}{192}$ qr.

32 h. an. : 7980439 h. an. : : 97 qr.
116 : 100
32×29 7980439×25
928 199510975×97
928)19352564575
$20854056\frac{607}{928}$qr. = £21722, 19s. $6\frac{607}{3712}$d.

9. £1 : £487·75 : : 100 reals
2,0)4877,5 reals
2438 du. 15 re.

£1 : £670·625 : : 100 reals
2,0)$67062\frac{1}{2}$ reals
3353 du. $2\frac{1}{2}$ reals

10. £1 : $£4725\frac{19}{80}$: : $615\frac{3}{8}$ grani
80 378019 × 4923
8,0)186098753,7
8)$23262344\frac{17}{80}$
1,00)$29077,93\frac{17}{640}$ grani
29077 duc. $93\frac{17}{640}$ gr.

£1 : $£4725\frac{19}{80}$: : $603\frac{3}{4}$ gr. : $\frac{378019}{80} \times \frac{2415}{4} =$
$\frac{182583177}{64}$ gr. = 28528 duc. $62\frac{9}{64}$ gr.

£1 : $£8476\frac{123}{160}$: : $\frac{4923}{8}$ gr. : $\frac{1356283}{160} \times \frac{4923}{8} =$
$\frac{6676981209}{1280}$ gr. = 52163 duc. $91\frac{729}{1280}$ gr.

£1 : $£8476\frac{123}{160}$: : $\frac{2415}{4}$ gr. : $\frac{1356283}{160} \times \frac{2415}{4} =$
$\frac{655084689}{128}$ gr. = 51178 duc. $49\frac{17}{128}$ gr.

11. $\frac{20s.}{4} : \frac{16s.}{5} :: £475, 15s.$
4
5)1903 0
Ster., £380, 12s.

$\frac{20s.}{5} : \frac{16s.}{4} :: £750, 12s. 6d.$
4
5)3002 10 0
Ster., £600, 10s. 0d.

21. $52\frac{1}{2}d. : £150, 2s. 6d. :: 1000$ reas.
$\frac{105 h.d.}{7}$ 72060 h. d.
4804 × 1000
7)4804000
$686285\frac{5}{7}$ rs.

95h.d. : 72060h.d. :: 1000rs. : $\frac{14412000}{19}$ reas = 758 milr. $526\frac{6}{19}$ reas.
105 h.d. : 88400 h.d. :: 1000 reas :: $\frac{17680000}{21}$ reas = 841 milr. $904\frac{16}{21}$ reas.
95 h. d. : 88400 h. d. :: 1000 reas : $\frac{17680000}{19}$ reas = 930 milr. $526\frac{6}{19}$ reas.

13. £1 : £73·775 :: 25·10 fr.
1851 fr. $75\frac{1}{4}$ ct.

$\frac{240d.}{30} : 302536d. :: 25·10$ fr.
37817 × 25·10
30)949206·7
31640 fr. $22\frac{1}{3}$ ct.

14. 2520 ct. : 478470 ct. :: £1 : £189, 17s. $4\frac{1}{2}$d. $\frac{2}{7}$

2520 ct. : 784685 ct. :: £1 : £311, 7s. $7\frac{3}{4}$d. $\frac{13}{21}$

15.
$\frac{240d.}{60} : 28889d. :: 25·16$ lire
6·29 6·29
60)181711·81
3028 lire, $53\frac{1}{6}$ ct.

240d. : 28889d. :: 24·85 lire
240)717891·65
2991 lire $21\frac{25}{48}$ ct.

$\frac{240d.}{60} : 1278692d. :: 25·16$ lr.
319673 × 25·16
60)8042972·68
134049 lr. $54\frac{7}{15}$ ct.

$\frac{240d.}{60} : 1278692d. :: 24·85$ lr.
319673 × 24·85
60)7943874·05
132397 lr. $90\frac{1}{12}$ ct.

16. 1 rub. : 27151·45 rub. :: 37d. : 1004603·65d., or £4185, 16s. $11\frac{1}{2}$d. $\frac{3}{5}$
1 rub. : 27151·45 rub. :: 37·5d. : 1018179·375d., or £4242, 8s. $3\frac{1}{4}$d. $\frac{1}{2}$
1 rub. : 30171·5 rub. :: 37d. : 1116345·5d., or £4651, 8s. $9\frac{1}{2}$d.
1 rub. : 30171·5 rub. :: 37·5d. : 1131431·25d., or £4714, 5s. $11\frac{1}{4}$d.

17.

$4\frac{40}{90}$ dol. . $3783\frac{63}{90}$ dol. : : £1
109 : 100
$\overline{4,00} \times 109$ $\overline{340533} \times 1,00$
436) 340533
£781, 0s. $9\frac{1}{4}$d. $\frac{47}{109}$

$4\frac{40}{90}$ dol. : $3783\frac{63}{90}$ dol. : : £1
110 : 100
$\overline{4,00} \times 110$ $\overline{340533} \times 1,00$
440) 340533
£773, 18s. $9\frac{1}{4}$d. $\frac{1}{11}$

17.

$4\frac{80}{180}$dol. : $21950\frac{81}{180}$dol. : : £1
109 : 100
$\overline{8,00} \times 109$ $\overline{3951081} \times 1,00$
872) 3951081
£4531, 1s. $1\frac{1}{4}$d. $\frac{103}{109}$

$4\frac{80}{180}$dol. : $21950\frac{81}{180}$dol. : : £1
100 : 100
$\overline{8,00} \times 110$ $\overline{3951081} \times 1,00$
880) 3951081
£4489, 17s. $3\frac{1}{2}$d. $\frac{7}{11}$

18.
200 grosch. : 536095 grosch. : : £1 : £2680, 9s. 6d.
205 grosch. : 536095 grosch. : : £1 : £2615, 1s. $11\frac{1}{4}$d. $\frac{27}{41}$

19. 25·25 fr. : 250·50 fr. : : £1 : £9, 18s. $4\frac{3}{4}$d. $\frac{97}{101}$
25·23 fr. : 250·50 fr. : : £1 : £9, 18s. $6\frac{3}{4}$d. $\frac{1287}{2523}$

20.

£12 : £13 : : £47, 12s. 6d.
$\frac{1}{12}$ = 3 19 $4\frac{1}{2}$
Jersey mon., £51, 11s. $10\frac{1}{2}$d.

£12 : £13 : : £96, 15s. 9d.
$\frac{1}{12}$ = 8 1 $3\frac{3}{4}$
Jrsy. money, £104, 17s. $0\frac{3}{4}$d.

ARBITRATION OF EXCHANGE.

1.
yd. En.? = 1176 yd. Hamb.
6 yd. Hamb. = 5 yd. Hol.
7 〃 Hol. = 4 〃 Fr.
5 〃 Fr. = 5 〃 En.
560 yd. Eng.

yd. Ham.? = 100 yd. En.
5 〃 En. = 5 〃 Fr.
4 〃 Fr. = 7 〃 Hol.
5 〃 Hol. = 6 〃 Ham.
210 yd. Ham.

2.
M. Bco.? = £1
£1 = 11·77 fl.
35·20 fl. = 40 M.Bco.
8 8) 107
13 M. 6 sch.

3.
fl.? = £1
£1 = 13·5 M.Bco.
40 M. Bco. = 35·2 fl.
11·88 fl.

4.
$$\begin{array}{lcl}
\text{fr.?} & = & \pounds 1\\
\pounds 1 & = & 11{\cdot}75\text{ fl.}\\
35{\cdot}20\text{ fl.} & = & 40\text{ M. Bc.}\\
\underline{100}\text{ M.Bc.} & = & 188{\cdot}21\text{ fr.}\\
32 & & 32\overline{)804{\cdot}17}\\
 & & \overline{25{\cdot}13\tfrac{1}{32}}\text{ fr.}
\end{array}$$

5.
$$\begin{array}{lcl}
\text{dur.?} & = & \pounds 1\\
\pounds 1 & = & 11{\cdot}96\text{ fl.}\\
\underline{2{\cdot}40}\text{fl.} & = & 1\text{ duro.}\\
60 & & 60\overline{)299}\\
 & & \overline{4\text{ du. }19\tfrac{2}{3}}\text{re.}
\end{array}$$

6.
$$\begin{array}{lcl}
\pounds ? & = & 18753\text{ fr.}\\
188\text{ fr.} & = & 100\text{ M. Bco.}\\
40\text{ M. Bco.} & = & 35{\cdot}18\text{ fl.}\\
\underline{11{\cdot}97}\text{ fl.} & = & \pounds 1\\
12 & & 12\overline{)8795}\\
 & & \overline{\pounds 732,\ 18\text{s. }4\text{d.}}
\end{array}$$

PROMISCUOUS EXERCISES IN EXCHANGE.

1. £100 : £1127, 10s. : : £120 cur. : £1353 cur.
2. 30·5 T. lire : 3708 T. lire : : £1 : £121, 11s. 5½d. $\frac{40}{61}$
3. 1 mlr. : 9210 mlr. : : 56d. : 515760d., or £2149
4. 11·96 fl. : 19351·45 fl. : : £1 : £1618, 0s. 3¼d. $\frac{193}{299}$
5. £1500 : £1 : : 17970 fl. : 11 fl. 98 ct. per £1
6. 25·225 fr. : 1884·20 fr. : : £1 : £74, 13s. 10¾d. $\frac{817}{1009}$

7.
$$\begin{array}{l}
\text{M. Bco. } 13{\cdot}5 : 18975 : \pounds 1\\
\qquad \underline{125} : \quad 100\\
\qquad\ \ 9\ \ \overline{)10120}\\
\qquad \overline{\pounds 1124,\ 8\text{s. }10\tfrac{1}{2}\text{d. }\tfrac{2}{3}}
\end{array}$$

8.
$$\begin{array}{l}
\text{M. Bco. } 40 : 4816 : : \underline{35{\cdot}20}\text{ fl.}\\
\qquad \underline{124} : \quad \underline{100} \quad 22\\
\qquad\ \ 31 \quad 4816\times 22\\
\qquad 31\overline{)105952}\\
\qquad \overline{3417\text{ fl. }80\tfrac{20}{31}}\text{ cts.}
\end{array}$$

9.
$$\begin{array}{l}
25{\cdot}225\text{fr.}-25{\cdot}10\text{fr.}={\cdot}125\text{fr.,}\\
\quad\text{then,}\\
25{\cdot}10\text{ fr.} : {\cdot}125\text{ fr.} : : \pounds 1200\\
\qquad 25{\cdot}1\overline{)150}\\
\quad\text{Gain,}\qquad \overline{\pounds 5{\cdot}976}
\end{array}$$

10.
$$\begin{array}{l}
13\text{M.}13\text{sch.}-13\text{M.}=13\text{sch.,}\\
\quad\text{then,}\\
\underline{13\times 16\text{sch.}} : 13\text{sch.} : : \pounds 1000\\
\qquad 2 \qquad\quad 2\overline{)125}\\
\quad\text{Loss,}\qquad \overline{\pounds 62,\ 10\text{s.}}
\end{array}$$

11.
12 fl. — 11·75 fl. = ·25 fl.;
hence,
11·75 fl. : ·25 fl. : : £6000
47 47)6000
Gain, £127·660

and £127·660÷60=£2·1276
gain per cent.

12. £120 : £118 : : £780·75
4 59 × 52·05
4)3070·95
£767·7375

13.
$13\frac{8}{32}$ M.Bco. : $\frac{13}{32}$ M. : : £4000
424 13×500 500
53 53)6500
Gain, £122·641

and £122·641÷40=£3·066
gain per cent.

14. 48d. : 9d. : : £750
16 3×750
16)2250
£140, 12s. 6d.

and £140·625÷7·5=£18·75
gain per cent.

15. 7909·5 R. D.
9⅛ R. D. = 12 fl.
400 = 401
11·96 fl. = £1
73×299 7909·5×2406
21827) 19030257
£871·868

16. £1082·25
£1 = 13 M. Bco.
400 = 401
300 M. Bco. = 203 R. D.
400)3817597·1925
9543·99298⅛ R. D.

17.
13½M.Bco. : 1080M.Bco. : : £1
27)2160
Direct, £80

1080 M. Bco.
40 M. Bco. = 35·2 fl.
12 fl. = £1
9×8·8
Thro' Holland, £79, 4s.

Cheaper thro' Hol., by 16s.

18.
30·5 lire : 146400 lire : : £1
100 : 97
48×97
£4656

19.
1 rub. : 8760 rub. : : 37½d.
£1368·75 = 328500d. direct

8760 rub.
1 rub. = 187·5 ct.
1197·5 ct. = £1
479)657000
Thro' Holland, £1371·608

8760 rub.
1 rub. = 34 sch.
216 sch. = £1
9)12410
Thro' Hamb., £1378·$\dot{8}$

20.
1500 fr.
214 fr. = 100 fl.
11·95 fl. = £1
255·73) 15000
£58·656

21.
$9\frac{1}{12}$ R. D. : 8400 R. D. : : £1
109)100800
£924·771 direct

8400 R. D.
9 R. D. = 12 fl.
11·96 fl. = £1
200 = 201
299)281400
Thro' Holland, £941·137

22.
fr. fr.
25·3)24000
£948·6166 drawn for
$\frac{1}{200}$ = 4·74308 commis.
£953·35968 amt. redr.
£1 = 25·2 fr.
24024·663936 francs
A lost, 24·663936 fr.

23.
fl. fl.
11·9)7896
£663·5294 drawn
Again,
7896 fl.
$\frac{1}{200}$ = 39·48 commission
12 fl.)7935·48 fl.
£661·29 on London
$\frac{1}{100}$ = 6·6129 com.
£667·9029 remit. by A
Lost, £4·3735

24.
$13\frac{1}{2}$ M. Bco. : 1728 M. Bco. : : £1
27)3456
£128 direct

1728 M. Bco.
40 M. Bco. = 3520 ct.
1190 ct. = £1
200 = 201
119)15282·432
Thro' Holland, £128·424

25.
10·2 fl. : 4800 fl. : : £1
£470·588

4800 fl.
85·5 fl. = 100 Neth. fl.
200 = 201
11·96 fl. = £1
5681)2680000
Thro. Holland, £471·748

4800 fl.
75 fl. = 100 M. Bco.
200 = 201
13 M. Bco. = £1
13)6432
Thro. Hamb., £494·769

26.
12 fl.) 4800 fl.
£400 drawn
$\frac{1}{60}$ = $6\cdot\dot{6}$ int. for 4 mo.
£$406\cdot\dot{6}$ val. of draft
Again,
4800 fl.
$\frac{1}{200}$ = 24 commission
11·9 fl.)4824 fl.
£405·378 remitted
E gained, £1·288

27. 1956½ yd. linen at 16½d. = £134, 10s. 2¼d.
1620 " " " 14d. = 94 10 0
Value of the adventure, £229, 0s. 2¼d.

	Milreas.
1956½ yd. at 713 reas =	1394·9845
1620 " " 624 " =	1010·8800
Gross amount,	2405·8645
Less com. 3½ p. c.,	84·2053
Net proceeds,	2321·6592
Profit ⅒ of 1470 milr.	147·0000
Amount of returns,	2468·6592

And this at 56d. per milrea is, £576, 0s. 4¾d.
Hence, gained by exporter, £347, 0s. 2½d.

ALLIGATION.

ALLIGATION MEDIAL.

1. 4d. × 8 = 2s. 8d.
5d. × 5 = 2 1
8d. × 7 = 4 8
20) 9s. 5d.
Av., per lb., 0s. 5½d. ⅗

2. 3s. 4d. × 8 = 26s. 8d.
4 0 × 12 = 48 0
4 8 × 16 = 74 8
36) 149s. 4d.
Av., per lb., 4s. 1¾d. ⅑

3. 6s. 3d. × 7 = 43s. 9d.
7 6 × 9 = 67 6
7 11¾ × 12 = 95 9
10 3 × 4 = 41 0
32) 248s. 0d.
Av., per gal., 7s. 9d.

4. 5s. 4d. × 9 = 48s. 0d.
6 8 × 8 = 53 4
7 7 × 8 = 60 8
0 0 × 3 = 0 0
28) 162s. 0d.
Av., per gal., 5s. 9¼d. 4/7

5. 3s. 6d. × 18 = 63s. 0d.
5 7 × 12 = 67 0
4 4 × 16 = 69 4
46 199s. 4d.
10 11
460) 2192s. 8d.
Per gal., 4s. 9⅕d.

6. 22 car. × 6 = 132
18 × 12 = 216
15 × 18 = 270
36) 618
Per oz., 17⅙ car.

ALLIGATION ALTERNATE.

7. $3s.\ \left\{\begin{array}{ll} 2\tfrac{1}{2}s. & \tfrac{1}{3} \\ 3\tfrac{1}{3}s. & \tfrac{1}{2} \end{array}\right.$ *i.e.*, the quantities are as $\tfrac{1}{3}$ is to $\tfrac{1}{2}$, or as *two* is to *three*.

8. $2\tfrac{1}{2}s.\ \left\{\begin{array}{ll} 3s. & \tfrac{1}{2} \\ 2s. & \tfrac{1}{2} \end{array}\right.$ *i.e.*, the quantities must be equal.

9\.
$$8d.\ \left\{\begin{array}{llll} 4d. & 1 & = 1 \text{ lb. at } 4d. = & 4d. \\ 6d. & 1 & = 1 \text{ 〃 } 6d. = & 6 \\ 9d. & 4 + 2 = 6 & \text{ 〃 } 9d. = & \underline{54} \\ & 8d. \times \overline{8} & = & \overline{64d.} \end{array}\right.$$

10\.
$$7s.\ \left\{\begin{array}{llll} 4s. & 1 & = 1 \text{ gal. at } 4s. = & 4s. \\ 5s. & 1 & = 1 \text{ 〃 } 5s. = & 5 \\ 6s. & 1 & = 1 \text{ 〃 } 6s. = & 6 \\ 8s. & 3 + 2 + 1 = 6 & \text{ 〃 } 8s. = & \underline{48} \\ & 7s. \times \overline{9} & = & \overline{63s.} \end{array}\right.$$

11\.
$$15s.\ \left\{\begin{array}{lll} 18s. & 15 \text{ or } 5 \text{ gal. of spirits} = & 90s. \\ 0s. & 3 \text{ or } \underline{1} \text{ gal. of water} = & \underline{0} \\ & \overline{6} \times 15s. = & \overline{90s.} \end{array}\right.$$

12\.
$$22d.\ \left\{\begin{array}{ll} 9d. & 2 + 8 = 10 \text{ or } 1 \text{ girl} \\ 15d. & 2 + 8 = 10 \text{ or } 1 \text{ boy} \\ 24d. & 13 + 7 = 20 \text{ or } 2 \text{ women} \\ 30d. & 13 + 7 = 20 \text{ or } 2 \text{ men} \end{array}\right.$$

i.e., The same number of boys and girls and twice that number of men and women may be employed.

13\.
$$5\tfrac{1}{2}s.\ \left\{\begin{array}{llll} 4s. & \tfrac{1}{2} & = \tfrac{1}{2} \times 8 = 4 \text{ gal. at } 4s. = & 16s. \\ 5s. & \tfrac{1}{2} & = \tfrac{1}{2} \times 8 = 4 \text{ 〃 } 5s. = & 20 \\ 6s. & 1\tfrac{1}{2} + \tfrac{1}{2} = \underline{2} & \times 8 = \underline{16} \text{ 〃 } 6s. = & \underline{96} \\ & \overline{3} & \times 8 = \overline{24} \times 5\tfrac{1}{2}s. & \overline{132s.} \end{array}\right.$$

14\.
$$7s.\ \left\{\begin{array}{llll} 4s. & 2 & = 2 \times 5 = 10 \text{ lb. at } 4s. = & 40s. \\ 6s. & 2 & = 2 \times 5 = 10 \text{ 〃 } 6s. = & 60 \\ 9s. & 3 + 1 = \underline{4} & \times 5 = \underline{20} \text{ 〃 } 9s. = & \underline{180} \\ & \overline{8} & \times 5 = \overline{40} \times 7s. = & \overline{280s.} \end{array}\right.$$

15\.
17 ca. {
9 car.— 1+5 $= 6\times\frac{25}{48} = 3\frac{1}{8}$ oz. 9 ca.
12 car.— 1+5 $= 6\times\frac{25}{48} = 3\frac{1}{8}$ ″ 12 ″
15 car.— 1+5 $= 6\times\frac{25}{48} = 3\frac{1}{8}$ ″ 15 ″
18 car.— 8+5+2 $=15\times\frac{25}{48} = 7\frac{13}{16}$ ″ 18 ″
22 car.— 8+5+2 $=15\times\frac{25}{48} = 7\frac{13}{16}$ ″ 22 ″
$\overline{48}\times\frac{25}{48}=\overline{25}$

16\.
66s. {
0s. — 18 $= 18 \times \frac{2}{5} = 7\frac{1}{5}$ oz. cop.
$5\frac{1}{2}$s.— 18 $= 18 \times \frac{2}{5} = 7\frac{1}{5}$ ″ silv.
84s.— $66+60\frac{1}{2} = 126\frac{1}{2} \times \frac{2}{5} = 50\frac{3}{5}$ ″ gold
$\overline{162\frac{1}{2}} \times \frac{2}{5} = \overline{65}$ oz. mix.

17\.
$5\frac{1}{2}$s. {
4s.— $1\frac{1}{2} \times 12 = 18$ gal. at 4s. = 72s.
5s.— $\frac{1}{2} \times 12 = 6$ ″ ″ 5s. = 30
6s.— $\frac{1}{2} \times 12 = 6$ ″ ″ 6s. = 36
7s.— $1\frac{1}{2} \times 12 = 18$ ″ ″ 7s. = 126
$\overline{48} \times 5\frac{1}{2}$s. $= \overline{264}$s.

18\.
$8\frac{1}{2}$s. {
7s.— $1\frac{1}{2} \times 12 = 18$ bu. at 7s. = 126s.
8s.— $\frac{1}{2} \times 12 = 6$ ″ ″ 8s. = 48
9s.— $\frac{1}{2} \times 12 = 6$ ″ ″ 9s. = 54
10s.— $1\frac{1}{2} \times 12 = 18$ ″ ″ 10s. = 180
$\overline{48} \times 8\frac{1}{2}$s. $= \overline{408}$s.

19\.
$5\frac{1}{3}$s. {
4s.— $\frac{1}{6} \times 18 = 3$ gal. at 4s. = 12s.
5s.— $\frac{2}{3} \times 18 = 12$ ″ ″ 5s. = 60s.
$5\frac{1}{2}$s.— $1\frac{1}{3} \times 18 = 24$ ″ ″ $5\frac{1}{2}$s. = 132s.
6s.— $\frac{1}{3} \times 18 = 6$ ″ ″ 6s. = 36s.
$\overline{45} \times 5\frac{1}{3}$s. $= \overline{240}$s.

20\.
11 h. d. {
4 h. d.— 1+3 $= 4\times3=12$ at 2d.
6 h. d.— 1+3 $= 4\times3=12$ ″ 3d.
8 h. d.— 1+3 $= 4\times3=12$ ″ 4d.
10 h. d.— 1+3 $= 4\times3=12$ ″ 5d.
12 h. d.— 7+5+3+1 $=16\times3=48$ ″ 6d.
14 h. d.— 7+5+3+1 $=16\times3=48$ ″ 7d.

POSITION.

SINGLE POSITION.

1. Suppose the number to be 1; then, $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{25}{12}$; hence, 25 : 12 : : 125 : 60, the number.
2. Suppose the value to be £1; then, $1 - (\frac{1}{3} + \frac{1}{4}) = \frac{5}{12}$; hence; 5 : 12 : : £15 : £36, the value.
3. Suppose his age to be 1; then, $1 + \frac{1}{3} + \frac{1}{4} + \frac{1}{6} = \frac{21}{12}$; hence, 21 : 12 : : 63 ye. : 36 years his age.
4. Suppose the number to be 1; then, $(1 + \frac{1}{3} + \frac{1}{4}) \times \frac{4}{5} = \frac{19}{12} \times \frac{4}{5} = \frac{76}{60}$, hence, $\frac{76}{60}$: 1 : : 76 : 60, the number.
5. Suppose 1 pear-tree, then there are $\frac{4}{3}$ apple-trees, $\frac{4}{5}$ plum, $\frac{16}{15}$ cherry-trees, then $1 + \frac{4}{3} + \frac{4}{5} + \frac{16}{15} = \frac{21}{5}$; hence, 21 : 5 : : 252 : 60 pear-trees, and $60 \times \frac{4}{3} =$ 80 apple-trees, $60 \times \frac{4}{5} = 48$ plum-trees; $60 \times \frac{16}{15} = 64$ cherry-trees.
6. Suppose £500 to be the sum, then the amount of £500 for 5 years at 5 per cent. is £625; hence, £625 : £656·25 : : £500 : £525.
7. Suppose the 1st receives £80, then the 2d has $\frac{5}{8}$ of £80 or £50, and the 3d $\frac{4}{5}$ of £50 or £40; now £80 + £50 + £40 = £170, which should be £153, 17s.; hence £170 : £80 : : £153, 17s. : £72, 8s. share of the 1st, $\frac{5}{8}$ of £72, 8s. or £45, 5s. share of 2d, and $\frac{4}{5}$ of £45, 5s. or £36, 4s. share of 3d.
8. Suppose 37800 men, then $37800 - (\frac{1}{7} + \frac{1}{9} + \frac{1}{10} + \frac{1}{21})$ of $37800 = 37800 - 15180 = 22620$; hence, 22620 : 18850 : : 37800 men : 31500 men.
9. Suppose the 1st has £240, then the 2d has $\frac{3}{4}$ of £240 or £180, the 3d $\frac{3}{5}$ of £240 or £144, and the 4th $\frac{1}{2}$ of £240 or £120; now £240 + £180 + £144 + £120 = £684, hence £684 : £718·2 : : £240 : £252 share of 1st, $\frac{3}{4}$ of £252 = £189 share of 2d., $\frac{3}{5}$ of £252 = £151, 4s. sh. of 3d., and $\frac{1}{2}$ of £252 = £126 sh. of 4th.

DOUBLE POSITION.

10. I. Suppose the no. to be 0, then 0 + 16 = 16, and 56 − 16 = 40, the 1st error.

II. Suppose the no. to be 1, then $(1 \times 2) + 16 = 18$, and $56 - 18 = 38$, the 2d error.

Hence, $(40 - 38) : (1 - 0) :: 38 : 19$ cor. for 2d. supposition, therefore $1 + 19 = 20$ the number.

11. I. Suppose A got £0, B £4, and C £8, then $0 + 4 + 8 = 12$, and $36 - 12 = 24$, the 1st error.

II. Suppose A got £1, B £$4\frac{2}{3}$, and C £$8\frac{1}{2}$, then $1 + 4\frac{2}{3} + 8\frac{1}{2} = 14\frac{1}{6}$, and $36 - 14\frac{1}{6} = 21\frac{5}{6}$ the 2d error.

Hence, $(24 - 21\frac{5}{6}) : (1 - 0) :: 24 : 11\frac{1}{13}$ cor. for 1st supp.; therefore A's share is £$11\frac{1}{13}$, B's (£$11\frac{1}{13} \times \frac{2}{3}$) + £4 = £$11\frac{5}{13}$, and C's (£$11\frac{5}{13} \times \frac{3}{4}$) + £5 = £$13\frac{7}{13}$.

12. I. Suppose the no. to be 5, then $\{(5 \times 7) - 30\} \div 5 = 1$, and $5 - 1 = 4$ the 1st error.

II. Suppose the no. to be 10, then $\{(10 \times 7) - 30\} \div 5 = 8$, and $10 - 8 = 2$, the 2d error.

Hence, $(4 - 2) : (10 - 5) :: 4 : 10$ cor. for 1st supp.; therefore the number is $10 + 5 = 15$.

13. I. Assume 20 gal. at 8s. and 40 at 10s., then the 60 gal. = 560s., but 60 at 8s. 10d. = 530s., therefore, $560 - 530 = 30$, the 1st error.

II. Assume 30 gal. at 8s. and 30 at 10s., then the 60 gal. = 540s., but 60 gal. at 8s. 10d. = 530s.; therefore, $540 - 530 = 10$, the 2d error.

Hence, $(30 - 10) : (30 - 20) :: 10 : 5$ cor. for 2d. supp.; therefore $30 + 5 = 35$ gal. at 8s. and 25 gal. at 10s.

14. I. Suppose 1 cr., then $10 + \frac{1}{8} + \frac{1}{9} + \frac{1}{6} + \frac{1}{12} = 10\frac{35}{72}$, and $45 - 10\frac{35}{72} = 34\frac{37}{72}$, the 1st error.

II. Suppose 2 cr., then $10 + (2 \times \frac{35}{72}) = 10\frac{70}{72}$, and $45 - 10\frac{70}{72} = 34\frac{2}{72}$, the 2d error.

Hence, $(34\frac{37}{72} - 34\frac{2}{72}) : (2 - 1) :: 34\frac{2}{72} : 70$ corr. for 2d supp.; therefore $2 + 70 = 72$ crowns.

15. I. Suppose 3 beggars, then (4d. × 3) + 8d. = 20d. his money, also (5d. × 3) − 4d. = 11d. his money; hence, $20 - 11 = 9$, the 1st error.

II. Suppose 6 beggars, then (4d. × 6) + 8d. = 32d. his money, also (5d. × 6) − 4d. = 26d. his money; hence, $32 - 26 = 6$, the 2d error.

Hence, $(9 - 6) : (6 - 3) :: 9 : 9$ cor. for 1st supp.; therefore $3 + 9 = 12$ beggars.

< 961 = 28629151 = 31^5
< ·064 = ·004096 = $·4^6$
$\frac{17}{125}$ = $\frac{2187}{78125}$ = $(\frac{3}{5})^7$
25 × ·000625 = ·000000390625

$\frac{5}{7}$ = $\frac{3125}{7776}$ = $(\frac{5}{6})^5$
5 × 2·25 = 11·390625 = $(2·25)^3$
s. in. = 10 s. ft. 4 s. in., area.
25 s. ft. × 5 ft. = 125 c. ft.
= 27 × 125 = 3375 cubes.
oz. = 6 tons, 2 qr. 4 lb., wt. of wa.
n 78^3 ÷ $277\frac{1}{4}$ = 474552 × $\frac{4}{1109}$
1$\frac{709}{1109}$ gallons.

OLUTION.

F THE SQUARE ROOT.

5. 1,23,43,21(1111
1
21) 23
1 21
221) 243
1 221
2221) 2221

6. 95,02,35,04(9748
81
187)1402
7 1309
1944) 9335
4 7776
19488)155904

7. ·53,29(·73
49
143) 429

16. I. Suppose the B. P. to be £18, then the gain on £18 at 18 p. c. is £3·24, and the S. P. £18 + £3·24 = £21·24; hence, 24 — 21·24 = — 2·76 the 1st error.

II. Suppose the B. P. to be £21, then the gain on £21 at 21 p. c. is £4·41, and the S. P. £21 + £4·41 = £25·41; hence, 25·41—24 = + 1·41 the 2d. error.

Hence, (1·41 + 2·76) : (21 — 18) :: 2·76 : 2 nearly; therefore, £18 + £2 = £20, B. P. of the horse.

17. I. Suppose 6 idle days, then (2s. 9d. × 18)—(1s. × 6) = 43s. 6d., and 43s. 6d. — 32s. 3d. = — 11s. 3d., 1st error.

II. Suppose 10 idle days, then (2s. 9d. × 14) — 10s. = 28s. 6d., and 32s. 3d. — 28s. 6d. = + 3s. 9d., the 2d error.

Hence, $(11\frac{1}{4} + 3\frac{3}{4})$: (10 — 6) :: $11\frac{1}{4}$: 3 cor. for 1st supp.; therefore 6 + 3 = 9 idle days.

INVOLUTION.

1. Root, 23
23
Square, 529

Root, 125
125
Square, 15625

$\left(\frac{40}{3}\right)^2 = \frac{40}{3} \times \frac{40}{3} = \frac{1600}{9} = 177\frac{7}{9}$

$\left(\frac{7}{9}\right)^2 = \frac{7}{9} \times \frac{7}{9} = \frac{49}{81}$

$\left(\frac{25}{2}\right)^2 = \frac{625}{4} = 156\frac{1}{4}$

Root, ·0075
·0075
Square, ·00005625

2. Root, 15
15
Square, 225
15
Cube, 3375

2. Root, 27
27
Square, 729
27
Cube, 19683

$(42\frac{1}{4})^3 = \left(\frac{169}{4}\right)^2 \times \frac{169}{4} = \frac{28561}{16} \times \frac{169}{4} = \frac{4826809}{64} = 75418\frac{57}{64}$

$\left(\frac{4}{5}\right)^3 = \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} = \frac{64}{125}$

Root, ·125
·125
Square, ·015625
·125
Cube, ·001953125

Root, ·00625
·00625
Square, ·0000390625
·00625
Cube, ·000000244140625

3. $31^3 \times 31^2 = 29791 \times 961 = 28629151 = 31^5$
$\cdot 4^3 \times \cdot 4^3 = \cdot 064 \times \cdot 064 = \cdot 004096 = \cdot 4^6$
$(\frac{3}{5})^4 \times (\frac{3}{5})^3 = \frac{81}{625} \times \frac{27}{125} = \frac{2187}{78125} = (\frac{3}{5})^7$
$\cdot 025^2 \times \cdot 025^2 = \cdot 000625 \times \cdot 000625 = \cdot 000000390625$
$= \cdot 025^4$
$(\frac{5}{6})^3 \times (\frac{5}{6})^2 = \frac{125}{216} \times \frac{25}{36} = \frac{3125}{7776} = (\frac{5}{6})^5$
$(2\cdot 25)^2 \times 2\cdot 25 = 5\cdot 0625 \times 2\cdot 25 = 11\cdot 390625 = (2\cdot 25)^3$

4. 38 in. × 38 in. = 1444 s. in. = 10 s. ft. 4 s. in., area.

5. 5 ft. × 5 ft. × 5 ft. = 25 s. ft. × 5 ft. = 125 c. ft.

6. $9^3 \div (\frac{3}{5})^3 = \frac{729}{1} \times \frac{125}{27} = 27 \times 125 = 3375$ cubes.

7. 1000 oz. × 6^3 = 216000oz. = 6 tons, 2 qr. 4 lb., wt. of wa.

8. 6 ft. 6 in. = 78 in., then $78^3 \div 277\frac{1}{4} = 474552 \times \frac{4}{1109}$
$= \frac{1898208}{1109} = 1711\frac{709}{1109}$ gallons.

EVOLUTION.

EXTRACTION OF THE SQUARE ROOT.

1.
5,76(24 root.
4
44)176

2.
2,07,36(144
1
24)107
4 96
284)1136

3.
62,25,21(789
49
148)1325
8 1184
1569)14121

4.
78,85,44(888
64
168)1485
8 1344
1768)14144

5.
1,23,43,21(1111
1
21) 23
1 21
221) 243
1 221
2221) 2221

6.
95,02,35,04(9748
81
187)1402
7 1309
1944) 9335
4 7776
19488)155904

7.
·53,29(·73
49
143) 429

8. 5·87,50(2·42384 —
4
44)187
4 176
482)1150
2 964
4843)18600
3 14529
48468)407100
8 387744
48476)19356

9. 48,76,83(698·343+
36
129)1276
9 1161
1388)11583
8 11104
13963)47900
3 41889
139664)601100
4 558656
1396683)4244400
4190049
54351

10. 91,48,74(956·49+
81
185)1048
5 925
1906)12374
6 11436
19124)93800
4 76496
191289)1730400
1721601
8799

11. 6,15,43,46(2480·795+
4
44)215
4 176
488)3943
8 3904
49607)394600
7 347249
496149)4735100
9 4465341
4961585)26975900
24807925
2167975

12. 5(2·236067977+
4
42)100
2 84
443)1600
3 1329
4466 27100
26796
304

11(3·31662479+
9
63)200
3 189
661)1100
1 661
6626)43900
6 39756
66326)414400
6 397956
663322)1644400
1326644
317756

13. 17·30,56(4·16
16
81)130
1 81
826)4956

14. ·8281(·91
81
181)181

15. $\sqrt{\frac{49}{144}} = \frac{7}{12}$
$\sqrt{\frac{81}{121}} = \frac{9}{11}$

16. $\frac{3}{4}$ = ·75(·8660254+
64
166)1100
6 996
1726)10400
6 10356
173202)440000
2 346404
1732045)9359600
8660225
699375
$\sqrt{\frac{529}{1296}} = \frac{23}{36}$

17. ·00,07,29(·027
4
47)329

18. 7,84·37,50(28·00669+
4
48)384
8 384
56006)375000
6 336036
560126)3896400
6 3360756
5601329)53564400
50411961
3152439

19. 68·33̇(8·26639784+
64
162)433
2 324
1646)10933
6 9876
16526) 105733
6 99156
165323)657733
3 495969
165326)161764

20. 4,86·11̇(22·04792759+
4
42)86
2 84
4404)21111
4 17616
44087)349511
7 308609
440949)4090211
9 3968541
4409582)12167011
8819164
3347847

21.

```
           ·00,00,07,84(·0028
                   4
                48)384
```

22.

```
           50,13,91,44,81(70809
           49
     1408) 11391
        8  11264
   141609) 1274481
```

23.

```
  ·00,00,00,00,53,29(·000073
                49
          143) 429
```

24.

```
           1,00,20,03,00,20,01)1001001
           1
     2001)        2003
        1         2001
     2002001        2002001
```

25.

```
           25,04,03,16,24,09(500403
           25
   10004      40316
       4      40016
   1000803      3002409
```

26.

```
           65,13,14,36,86,40,25(8070405
           64
     1607)  11314
        7   11249
     161404 ) 653686
          4   645616
     16140805)   80704025
```

27.

$$\begin{array}{rl}
 & 1,52,41,57,87,50,19,05,21(123456789 \\
 & 1 \\
22) & \overline{52} \\
2 & 44 \\
\hline
243) & 841 \\
3 & 729 \\
\hline
2464) & 11257 \\
4 & 9856 \\
\hline
24685) & 140187 \\
5 & 123425 \\
\hline
246906) & 1676250 \\
6 & 1481436 \\
\hline
2469127) & 19481419 \\
7 & 17283889 \\
\hline
24691348) & 219753005 \\
8 & 197530784 \\
\hline
246913569) & \underline{2222222121}
\end{array}$$

28.

$$\begin{aligned}
\sqrt{4 \times 36} &= \sqrt{144} = 12 \\
\sqrt{42\tfrac{1}{4} \times 4} &= \sqrt{169} = 13 \\
\sqrt{16 \times 9} &= \sqrt{144} = 12 \\
\sqrt{52\tfrac{1}{12} \times 12} &= \sqrt{625} = 25 \\
\sqrt{135 \times 7} &= \sqrt{945} = 30{\cdot}74085 \\
\sqrt{2{\cdot}16 \times {\cdot}75} &= \sqrt{1{\cdot}62} = 1{\cdot}27279
\end{aligned}$$

29. $\sqrt{{\cdot}78,54} = {\cdot}886228-$ side of the square

30. $\sqrt{480} = 21{\cdot}9089+$ poles, side of the sq. po.

31. $\begin{array}{l} 6400 \\ \quad 3 \end{array}$ perches

$\sqrt{1,92,00} = 138{\cdot}564+$ po., side of the sq. plantation

32.

$\sqrt{444+540+175+784 \text{ per.}} = \sqrt{19,43} = 44{\cdot}07947+$ poles, the side of the glebe.

33. $\sqrt{1208+904+\frac{1}{2}(2112)\text{ per.}} = \sqrt{3168} = 56{\cdot}28499-$ poles, side of the field.

34. 7,45,29(273 trees in a row.
4 1
47)345 272 spaces.
7 329 18
543 1629 4896 feet in a side.

35. $\sqrt{60^2\times 5} = \sqrt{1,80,00} = 134{\cdot}164+$ yd., diam. of greater walk

36. $\sqrt{20^2+(20^2\times\frac{7}{5})}, = \sqrt{400+(400\times\frac{7}{5})} = \sqrt{400+560}$
$= \sqrt{960} = 30{\cdot}9838$ feet.

37. $50^2 : 120^2 :: £74, 16s. 8d. : £431, 0s. 9½d. ⅖, the cost.

38. 65,12,49(807 trees in breadth.
64 10
1607)11249 8070 trees in length.

39. $\sqrt{(560+260)\text{per.}\times 3} = \sqrt{24,60} = 49{\cdot}598387$ pol. long.

40. $\sqrt{9+16} = \sqrt{25} = 5$
$\sqrt{25-9} = \sqrt{16} = 4$

41. 330 ft. 250 ft.
330 250
$\sqrt{108900-62500} =$
$\sqrt{46400} = 215{\cdot}4+$ ft. high

42. 585 ft. 449 ft.
585 449
$\sqrt{342225-201601} =$
$\sqrt{140624} = 375$ ft. broad

43. 248 ft. 224 ft.
248 224
$\sqrt{61504+50176} =$
$\sqrt{111680} = 334{\cdot}185577$ ft. l.

44.
$\sqrt{25^2+32^2} = \sqrt{625+1024}$
$= \sqrt{1649} = 40{\cdot}60788+$
ml. in a day; $40{\cdot}60788\times 5$
$= 203{\cdot}0394$ ml. in 5 days

45. $90^2 = 8100$ $90^2 = 8100$
$54^2 = 2916$ $60^2 = 600$
$\sqrt{5184} = 72$ ft.; $\sqrt{4500} = 67{\cdot}08204$ distance;
then, 72 ft. $+ 67{\cdot}0820393$ ft. $= 139{\cdot}08204$ ft. distance

46. $\sqrt{39605 \div 5} = \sqrt{7921} = 89$ men in the side; and, $89 \times 5 = 445$ men in front.

47. $\sqrt{£7776 \times £\frac{1}{6}} = \sqrt{1296} = 36$ men; $£7776 \div 36 = £216$

48. $\sqrt{30^2 + 30^2} = \sqrt{1\dot{8}00} = 42·4264$ ft. diag.

49. $\sqrt{25^2 - 12^2} = \sqrt{481} = 21·9317$ ft. high

50. $\sqrt{4 \text{ ac.} \times 4840 \div 5} = \sqrt{3872}$ yd. $= 62·2254$ yd. brd.; and, $62·2254$ yd. $\times 5 = 311·1270$ yd. long.

EXTRACTION OF THE CUBE ROOT.

1.

$$\begin{array}{lll}
 & 15,625(25 \text{ root} & \\
 & 8 \quad\quad 4 & \\
1200 & \overline{7625} \quad \overline{65} \times 5 = 325 & \\
325 & & \\
\overline{1525} \times 5 = 7625 & &
\end{array}$$

2.

$$\begin{array}{lll}
 & 21,024,576(276 \text{ root} & \\
1200 & 8 & 4 \\
469 &)\overline{13024} & \overline{67} \times 7 = 469 \\
\overline{1669} \times 7 = & 11683 & 14 \\
49 & & \overline{816} \times 6 = 4896 \\
\overline{218700} &)\overline{1341576} & \\
4896 & & \\
\overline{223596} \times 6 = & 1341576 &
\end{array}$$

3.

$$\begin{array}{lll}
 & 52,734,375(375 \text{ root} & \\
 & 27 & 6 \\
2700 &)\overline{25734} & \overline{97} \times 7 = 679 \\
679 & & 14 \\
\overline{3379} \times 7 = & 23653 & \overline{1115} \times 5 = 5575 \\
49 & & \\
\overline{410700} &)\overline{2081375} & \\
5575 & & \\
\overline{416275} \times 5 = & 2081375 &
\end{array}$$

4.

	490,982,336,369(	7889
	343	14
14700	)147982	218 × 8
1744		16
16444 × 8 =	131552	2348 × 8
64		16
1825200	)16430336	23649 × 9
18784		
1843984 × 8 =	14751872	
64		
186283200	)1678464369	
212841		
186496041 × 9 =	1678464369	

5.

	1,371,737,997,260,631 (	111111 root
	1	2
300	)371	31
31		2
331 × 1 =	331	331
1		2
36300	)40737	3331
331		2
36631 × 1 =	36631	33331
1		2
3696300	)4106997	333331
3331		
3699631 × 1 =	3699631	
1		
370296300 =	)407366260	
33331		
370329631 × 1 =	370329631	
1		
37036296300	)37036629631	
333331		
37036629631 × 1 =	37036629631	

6. 67,459,354,004,042,485,129 (4070809
64 8
480000)3459354 1207 × 7
8449 14
488449 × 7 = 3419143 122108 × 8
49 16
4969470000)40211004042 12212409 × 9
976864
4970446864 × 8 = 39763574912
64
49714237920000)447429130485129
109911681
49714347831681 × 9 = 447429130485129

7. 219,365,327,791 (6031
216 12
1080000)3365327 1803 × 3
5409 6
1085409 × 3 = 3256227 18091 × 1
9
109082700)109100791
18091
109100791 × 1 = 109100791

8. 344,237,608,531,512,161,929 (7008409
343 14
147000000)1237608531 21008 × 8
168064 16
147168064 1177344512 210244 × 4
64 8
14733619200)60264019512 21025209 × 9
840976
14734460176 58937840704
16
147353011680000)1326178808161929
189226881
147353200906881 1326178808161929

9.
·041,063,625(·345
27
2700)14063
376
3076 12304
16
346800)1759625
5125
351925 1759625

10.
484,846,678,016(7856
343
16444)141846
131552
1836925) 10294678
9184625
185008836)1110053016

11.
6,784(18·93049396
1
604)5784
4832
102141) 952000
919269
10733319) 32731000
32199957
107505741616) 531043000000
430022966464

12.
7,835·874,800(19·862282
1
651)6835
5859
112924) 976874
903392
11796876) 73482800
70781256
1183377964) 2701544000
2366755928

13. 3·000(1·4422495
1
436)2000
1744
60496)256000
241984
6229444)14016000
12458888
623895724)1557112000
1247791448

7·000(1·912931
1
651)6000
5859
108871)141000
108871
10955764)32129000
21911528
1097239521)10217472000
9875155689
109777313919)342316311000
329331941757

14. ·000,000,091,125(·0045
64
5425)27125

15. 784·673,416,880(9·223511
729
24844)55673
49688
2544724)5985416
5089448
255108189)895968880
765324567
25520502175)130644313000
127602510875

16. 70,846(41·3782175
64
4921)6846
4921
507999)1925000
1523997
51257479)401003000
358802353
5135423644)42200647000
41083389152
1117257848

17. ·000,918,559,457,280(·09720809
729
26239)189559
183673
2828524) 5886457
5657048
28345852864)229409280000
226766822912
2642457088

18. $\sqrt[3]{\frac{216}{343}} = \frac{6}{7}$; $\sqrt[3]{\frac{125}{512}} = \frac{5}{8}$; $\sqrt[3]{\frac{1728}{2197}} = \frac{12}{13}$

19. 27,081,892,655,918,127(300303
27
6
27000000 81892655 9003×3
27009 6
27027009 × 3 = 81081027 900903×3
9
270540270000 811628918127
2702709
270542972709×3 = 811628918127

---

20. 11,390·625(22·5 side of the cube.
8
1324)3390
2648
148525)742625
742625

21. $6\frac{1}{3} = 6{\cdot}33\dot{3}(1{\cdot}850166$
1 36
604)5333 66·6059 ft. side of greater.
4832
99925)501333
499625
1026805501) 1708333333
1026805501
102689430516)681527832333
616136583096
65391249237

22. 660 × 120 × 208 = 16473600 c. ft. content; hence,
16,473,600(254·4463 ft. side of the
8 cubic mound.
1525)8473
7625
190516)848600
762064
19385296)86536000
77541184
1941886096)8994816000
7767544384
1227271616

23. 18 lb. : 162 lb. : : $(8 \text{ in.})^3$
1 : 9 : : 512
512
4,608(16·64067 in. diameter.
1
516)3608
3096
79716)512000
478296
8286736)33704000
33146944
557056

24. $\sqrt[3]{3}\times 4 = 1·44225\times 4 = 5·769$ ft. long;
$\sqrt[3]{3}\times 3\frac{1}{3} = 1·44225\times 3\frac{1}{3} = 4·8075$ ft. broad;
$\sqrt[3]{3}\times 2\frac{1}{2} = 1·44225\times 2\frac{1}{2} = 3·6056$ ft. thick.

25. $12^3 : 28^3 :: 30$ lb. : $381\frac{1}{9}$ lb. the weight.

26. 56 lb. : 56×12 lb. :: $16^3 : 49152$, then $\sqrt[3]{49152} = 36·63$ in. diameter of the ball.

27. $\sqrt[3]{8^3\times 10} = 8\times\sqrt[3]{10} = 8\times 2·154435 = 17·23548$ ft. long; $\sqrt{6^3\times 10} = 6\times\sqrt[3]{10} = 6\times 2·154435 = 12·926610$ ft. broad; and $\sqrt[3]{4^3\times 10} = 4\times\sqrt[3]{10} = 4\times 2·154435 = 8·617740$ ft. thick.

Also, $8\times 6\times 4 = 192$ cubic feet, the content of the stone, and 1920 content of one 10 times as large; then $\sqrt{192+1920} = \sqrt{2112} = 12·83$ feet, side of a cube equal to both.

EXTRACTION OF ANY ROOT.

1. The nearest root is 3, of which the 4th power is 81.

$$\begin{array}{l}
97·41 \\
81 \qquad = 3^4 \\
2)\overline{16·41}\times 3 = 49·23 \\
\quad 8·21 \\
\quad 97·41 \\
\quad \overline{89·20}\times 3 \\
\overline{267·6} \\
\quad 81 \\
\overline{348·6})49·23(0·1412 \text{ cor.} \\
\qquad\qquad 3·0000 \\
\qquad\qquad \overline{3·1412} \text{ root.}
\end{array}$$

2. The nearest root is 1, the diff. is 2, and $(3-1)\times 4+1 = 9$ the divisor, and $\frac{2}{9} = ·2$ the correction, and the root is 1·2

$$\begin{array}{l}
3·00000 \\
2·48832 = (1·2)^5 \\
2)\overline{·51168}\times 1·2 = ·614016 \\
\quad ·25584 \\
\quad 3·00000 \\
\quad \overline{2·74416}\times 4 \\
\overline{10·97664} \\
\quad 2·48832 \\
\overline{13·46496})·614016(0·0457 \text{ cor.} \\
\qquad\qquad\qquad 1·2000 \\
\qquad\qquad\qquad \overline{1·2457} \text{root}
\end{array}$$

3.
33554432
243 $= 3^5$
2)9254432 × 3 = 27763296
4627216
33554432
28927216 × 4
115708864
243
140008864)277632960(2cor.
hence, 30 + 2 = 32 the root

4. 5308416
625 $= 5^4$
2)941584 × 5 = 4707920
470792
5308416
5779208 × 3
17337624
625
23587624)47079200(2 cor.
hence, 50 — 2 = 48 the root.

5.
7854
8 $= 2^3$
2)146 × 2 = 292
73
7854
7927 × 2
15854
8
23854)2920·0(0·12241 cor.
20·00000
19·87759 root

6.
21035·8
15625 $= 5^6$
2)5410·8 × 5 = 27054
2705·4
21035·8
18330·4 × 5
91652
15625
107277)27054·0(0·252 cor.
5·000
5·252 root

7.
7·0000
6·5536 $= 1{\cdot}6^4$
2)0·4464 × 1·6 = ·71424
0·2232
7·0000
6·7768 × 3
20·3304
6·5536
26·8840)·71424(0·02657 corr.
1·60000
1·62657 root.

8.

9·00000
7·59375 = $1{\cdot}5^{5}$
2)1·40625 × 1·5 = 2·109375
·70312
9·00000
8·29688 × 4
33·18752
7·59375
40·78127)2·1093750(0·0517 cor.
1·5000
1·5517 root.

9.

5·000000
4·826809 = $1{\cdot}3^{6}$
2)0·173191 × 1·3 = ·2251483
0·08659
5·00000
4·91341 × 5
24·56705
4·82681
29·39386)·22514830(0·00766 cor.
1·30000
1·30766 root.

10.

·000485613
·000512000 = $\cdot08^{3}$
2)·000026387 × ·08 = ·00000211096
·000013193
·000485613
·000498806 × 2
·000997612
·000512000
·001509612)·000002110960(·0013984 cor.
·0800000
·0786014 root.

11.

191,102976
64 = 2^6
2)127102976 × 2 = 254205952
63551488
191102976
127551488 × 5
637757440
64
701757440)2542059520(4 cor.
20
24 root.

12.

10·00000
10·48576 = $1{\cdot}6^5$
2)0·48576 × 1·6 = ·777216
0·24288
10·00000
10·24288 × 4
40·97152
10·48576
51·45728)·7772160(0·0151 cor.
1·6000
1·5849 root.

13.

⅓ = ·333333$\dot{3}$
·3205771 = $\cdot85^7$
2)·012756 × ·85 = ·0108428
·006378
·333333
·326955 × 6
1·961730
·320577
2·282307)·0108428(·00475 cor.
·85000
·85475 root.

14. $\frac{5}{12} = ·4166\dot{6}$
$·4182119424 = ·84^5$
$2)·0015452 \times ·84 = ·001298032$
·0007726
·4166666
$·4174392 \times 4$
1·6697568
·4182119
2·0879687)·001298032(·0006216 cor.
·8400000
·8393784 root.

15. 19.0000000
$17·0859375 = 1·5^7$
$2)1·9140625 \times 1·5 = 2·8710938$
·9570313
19·0000000
$18·0429687 \times 6$
108·2578122
17·0859375
125·3437497)2·8710938(0·0229 cor.
1·5000
1·5229 root.

16. $43\frac{3}{8} = 43·375$
$47·045881 = 1·9^6$
$2)3·670881 \times 1·9 = 6·9746739$
1·83544
43·375
$45·21044 \times 5$
226·05220
47·04588
273·09808)6·9746739(0·02554 cor.
1·90000
1·87446 root.

SERIES OR PROGRESSIONS.

ARITHMETICAL PROGRESSION.

1. $(42 - 12) \div (11 - 1) = 30 \div 10 = 3$ com. diff.
$(42 + 12) \times \frac{11}{2} = 54 \times 5\frac{1}{2} = 297$ sum.

2. $(51 - 3) \div (13 - 1) = 48 \div 12 = 4$s. com. diff.
$(51 + 3) \times \frac{13}{2} = 54 \times 6\frac{1}{2} = 351$s. the debt.

3. $(397 - 1) \div (100 - 1) = 396 \div 99 = 4$s. com. diff.
$(397 + 1) \div \frac{100}{2} = 398 \times 50 = £995$ whole price.

---

4. $(103 - 7) \div 4 + 1 = 24 + 1 = 25$ No. of terms.
$(103 + 7) \times \frac{25}{2} = 110 \times \frac{25}{2} = 1375$ sum.

5. $(61 - 1) \div 2 + 1 = 30 + 1 = 31$ rows.
$(61 + 1) \times \frac{31}{2} = 61 \times \frac{31}{2} = 961$ trees.

6. $(32 - 2) \div 3 + 1 = 10 + 1 = 11$ poor.
$(32 + 2) \times \frac{11}{2} = 34 \times \frac{11}{2} = 187$d. given.

7. $(60 - 6) \div 3 + 1 = 18 + 1 = 19$ days.
$(60 + 6) \times \frac{19}{2} = 66 \times \frac{19}{2} = 627$ miles.

---

8. $\frac{135}{9} \pm (1 \times 8) = 15 \pm 8 = 23$, and 7 extremes.

9. $\frac{4131}{51} \pm (51 \times 1\frac{1}{2}) = 81 \pm 76\frac{1}{2} = 157\frac{1}{2}$s., and $4\frac{1}{2}$s. first and last payments.

10. $\frac{345}{15} \pm (14 \times 1\frac{1}{2}) = 23 \pm 21 = 44$, and 2 mls. the first and last day's journey.

11. $\frac{110}{10} \pm (1 \times 9) = 11 \pm 9 = £2$ and £20 price of first and last horse.

---

12. $(3 \times 10) + 12 = 30 + 12 = 42$ the greatest term, and $(42 + 12) \times \frac{11}{2} = 27 \times 11 = 297$ sum.

13. $123 - (23 \times 5) = 123 - 115 = 8$ the least term, and $(123 + 8) \times 12 = 131 \times 12 = 1572$ the sum.

14. $3 + (11 \times 4) = 3 + 44 = 47$s. last share, and $(47 + 3) \times 6 = 50 \times 6 = 300$s. $=$ £15 divided.

15. $49 - (14 \times 3) = 49 - 42 = 7$ ml. the first day, and $(49 + 7) \times \frac{15}{2} = 28 \times 15 = 420$ miles journey.

GEOMETRICAL PROGRESSION.

1. $3\times2^7=3\times128=384$ the 8th term.
2. $5\times3^5=5\times243=1215$ greatest term.
3. $2\times3^4=2\times81=162$ the 5th term.
   $2\times3^7=2\times2187=4374$ the 8th term.
4. $\frac{1}{2}\times(\frac{1}{2})^5=\frac{1}{2}\times\frac{1}{32}=\frac{1}{64}$ the 6th term.
   $\frac{1}{2}\times(\frac{1}{2})^9=\frac{1}{2}\times\frac{1}{512}=\frac{1}{1024}$ the 10th term.
5. $\cdot2\times\cdot1^2=\cdot2\times\cdot01=\cdot002$ the 3d term.
   $\cdot2\times\cdot1^4=\cdot2\times\cdot0001=\cdot00002$ the 5th term.
6. $1\times2^{11}=2048$d. = £8, 10s. 8d. paid.
7. $2\times3^9=2\times19683=39366$d. = £164, 0s. 6d. paid for all.
   and $\frac{39366}{15}$d. $=2624\frac{2}{5}$d. = £10, 18s. $8\frac{2}{5}$d. paid for each.

---

8. $(3^8-1)\times1\div(3-1)=6560\times\frac{1}{2}=3280$ sum.
9. $(2^7-1)\times5\div(2-1)=127\times5=635$ sum.
10. $(1-(\frac{1}{3})^6)\times\frac{1}{5}\div(1-\frac{1}{3})=\frac{728}{729}\times\frac{3}{10}=\frac{364}{1215}$ sum.
11. $(2^{14}-1)\times5\div(2-1)=16383\times5=81915$s. = £4095, 15s. debt.
12. $(3^9-1)\times4\div(3-1)=19682\times2=39364$s. = £1968, 4s. daughter's portion.

---

13. $(\frac{3}{10})^2\div(\frac{3}{10}-\frac{3}{100})=\frac{9}{100}\times\frac{100}{27}=\frac{1}{3}$ sum.
14. $(\frac{1}{3})^2\div(\frac{1}{3}-\frac{1}{9})=\frac{1}{9}\times\frac{9}{2}=\frac{1}{2}$ the sum.
15. $10^2\div(10-9)=100$ miles.
16. $(\frac{7}{10})^2\div(\frac{7}{10}-\frac{7}{100})=\frac{49}{100}\times\frac{100}{63}=\frac{7}{9}$ ml.
17. $(\frac{9}{10})^2\div(\frac{9}{10}-\frac{9}{100})=\frac{81}{100}\times\frac{100}{81}=1$ the value.
18. $(\frac{4}{10})^2\div(\frac{4}{10}-\frac{4}{100})=\frac{16}{100}\times\frac{100}{36}=\frac{4}{9}$ the value.
19. $\frac{5}{10}+\{(\frac{3}{10})^2\div(\frac{3}{10}-\frac{3}{100})=\frac{5}{10}+(\frac{9}{100}\times\frac{100}{27})\}=\frac{15}{30}+\frac{10}{30}=\frac{25}{30}=\frac{5}{6}$ the value.
20. $\frac{25}{100}+\{(\frac{3}{10})^2\div(\frac{3}{10}-\frac{3}{100})\}=\frac{1}{4}+\frac{1}{3}=\frac{7}{12}$ the value.

PERMUTATIONS AND COMBINATIONS.

1. $1\times2\times3\times4\times5\times6\times7\times8\times9\times10\times11\times12\times13\times14\times15\times16\times17\times18\times19\times20\times21\times22\times23\times24 =$ 620448401733239439360000 changes.
2. $1\times2\times3\times4\times5\times6\times7\times8\times9=362880$ permutations.
3. $1\times2\times3\times4\times5\times6\times7\times8\times9\times10=3628800$ permut.
4. $1\times2\times3\times4\times5\times6\times7\times8\times9\times10\times11\times12 =$ 479001600 days, at £1, 12s. 6d., = £778377600, the whole expense.

---

5. $\frac{1\times2\times3\times4\times5\times6\times7\times8\times9\times10\times11\times12\times13\times14\times15}{1\times2\times3\times1\times2\times3\times1\times2\times1\times2} = \frac{1307674368000}{144} = 9081072000$ permutations.
6. $\frac{1\times2\times3\times4\times5\times6\times7\times8\times9}{1\times2\times1\times2\times1\times2\times3} = 15120$ permutations.
7. $\frac{1\times2\times3\times4\times5\times6\times7\times8\times9}{1\times2\times3\times1\times2\times3\times1\times2\times3} = \frac{362880}{216} = 1680$ permutations.
8. $\frac{1\times2\times3\times4\times5\times6\times7\times8\times9\times10\times11}{1\times2\times3\times1\times2\times3\times1\times2\times1\times2\times3} = \frac{39916800}{432} = 92400$ permut

---

9. $9\times8\times7 = 504$ changes.
   $9\times8\times7\times6\times5 = 15120$ changes.
10. $12\times11\times10\times9\times8 = 95040$ changes.
    $8\times7\times6\times5\times4\times3 = 20160$ changes.
    $9\times8\times7\times6\times5\times4\times3\times2 = 362880$ changes.
11. $10\times9 = 90$ permutations.
12. $26\times25\times24\times23\times22 = 7893600$ changes.

---

13. $\frac{12\times11\times10\times9\times8\times7\times6\times5}{1\times2\times3\times4\times5\times6\times7\times8} = \frac{19958400}{40320} = 495$ combin.
    $\frac{15\times14\times13\times12\times11\times10\times9\times8\times7}{1\times2\times3\times4\times5\times6\times7\times8\times9} = 5005$ com.
    $\frac{21\times20\times19\times18\times17\times16\times15\times14\times13\times12}{1\times2\times3\times4\times5\times6\times7\times8\times9\times10} = 352716$ comb.
14. $\frac{900\times899\times898\times897\times896\times895}{1\times2\times3\times4\times5\times6} = \frac{522639254696832000}{720} =$ 725887853745600 combinations.

15. $\frac{52\times51\times50\times49\times48\times47\times46\times45\times44\times43\times42\times41\times40}{1\times2\times3\times4\times5\times6\times7\times8\times9\times10\times11\times12\times13} =$
$\frac{3954242643911239680000}{6227020800} = 635013559600$ comb.

16. $\frac{100\times99\times98\times97\times96\times95\times94\times93\times92\times91}{1\times2\times3\times4\times5\times6\times7\times8\times9\times10} = \frac{62815650955529472000}{3628800}$
$= 17310309456440$ qr. $=$ £18031572350, 9s. 2d.

---

17. $2^9 = 512$, and $512-(9+1) = 502$ combinations.
18. $2^{26} = 67108864$, and $67108864-(26+1) = 67108837$ combinations.
19. $2^7 = 128$, and $128-(7+1) = 120$ combinations.
20. $2^{52}-(52+1) = 4503599627370496 - 53 =$ 4503599627370443 combinations.

---

21. $(5^6-1)\times5\div4 = 3124\times5\div4 = 15620\div4 = 3905$
22. $(9^9-1)\times9\div8 = 387420488\times9\div8 = 3486784392$ $\div8 = 435848049$
23. $(21^{21}-1)\times21\div20 = 5842587018385982521381124420$ $\times21\div20 = 6134716369305281647450180641$
24. $(13^{13}-1)\times13\div12 = 302875106592252\times13\div12 =$ 328114698808273

---

25. $13\times13\times13\times13 = 28561$ different ways.
26. $6\times6\times6\times6\times6 = 7776$ different ways.
27. $11\times11\times11 = 1331$ ways they be may chosen.
28. $4\times4\times4\times4\times4\times4\times4 = 16384$ times changed.

COMPOUND INTEREST.

Case I.—Table I., pa. 172.

1. £$400\times(1{\cdot}05)^3 =$ £$400\times1{\cdot}15763 =$ £$463{\cdot}052$
2. £$640\times(1{\cdot}03)^4 =$ £$640\times1{\cdot}12551 =$ £$720{\cdot}3264$
3. £$800\times(1{\cdot}04)^5 =$ £$800\times1{\cdot}21665 =$ £$973{\cdot}320$
4. £$800\times(1{\cdot}02)^{10} =$ £$800\times1{\cdot}21899 =$ £$975{\cdot}192$;
£$800\times(1{\cdot}01)^{20} =$ £$800\times1{\cdot}220189 =$ £$976{\cdot}1512$

5. $\pounds500\times(1{\cdot}03)^6 = \pounds500\times1{\cdot}19405 = \pounds597{\cdot}025$, and $\pounds597{\cdot}025-\pounds500 = \pounds97{\cdot}025$ compound interest.

6. $\pounds450\times(1{\cdot}03)^{10} = \pounds450\times1{\cdot}34392 = \pounds604{\cdot}764$, and $\pounds604{\cdot}764-\pounds450 = \pounds154{\cdot}764$

7. $\pounds725\times(1{\cdot}01)^{12} = \pounds725\times1{\cdot}126825 = \pounds816{\cdot}948$, and $\pounds816{\cdot}948-\pounds725 = \pounds91{\cdot}948$

8. $\pounds840\times(1{\cdot}01)^6 = \pounds840\times1{\cdot}06152 = \pounds891{\cdot}677$, and $\pounds891{\cdot}677-\pounds840 = \pounds51{\cdot}677$

CASE II.—Table II., pa. 173.

9. $\pounds840\times\frac{1}{(1{\cdot}03)^8} = \pounds840\times{\cdot}789409 = \pounds663{\cdot}104$

10. $\pounds210\times\frac{1}{(1{\cdot}05)^{10}} = \pounds210\times{\cdot}613913 = \pounds128{\cdot}922$

11. $\pounds350\times\frac{1}{(1{\cdot}04)^{10}} = \pounds350\times{\cdot}675564 = \pounds236{\cdot}447$

12. $\pounds300\times\frac{1}{(1{\cdot}025)^7} = \pounds300\times{\cdot}841265 = \pounds252{\cdot}3795$

13. $\pounds1280{\cdot}525\div(1{\cdot}05)^5 = \pounds1280{\cdot}525\div1{\cdot}27628 = \pounds1003{\cdot}326$

14. $\pounds1260\div(1{\cdot}045)^{10} = \pounds1260\div1{\cdot}55297 = \pounds811{\cdot}3486$

15. $\pounds1000\div(1{\cdot}02)^8 = \pounds1000\div1{\cdot}171659 = \pounds853{\cdot}4907$

16. $\pounds850\div(1{\cdot}0075)^{10} = \pounds850\div1{\cdot}077584 = \pounds788{\cdot}8016$

CASE III.

17. Lent, 1st June 1858, . . .	£750,	0s.	0d.
Interest for 1 year 129 days, . .	50	15	0¾
Amount,	800	15	0¾
Received, 8th October 1859, . .	180	0	0
Balance,	620	15	0¾
Interest for 1 year 85 days, . .	38	5	3½
Amount,	659	0	4¼
Received, 1st January 1861, . .	360	0	0
Balance,	299	0	4¼
Interest for 1 year 225 days, . .	24	3	4½
Amount,	323	3	8¾
Recd. the balance, 14th Aug. 1862,	£323,	3s.	8¾d.

18.	Borrowed, 18th Mar. 1861, at 4½ p.c.,	£600,	0s.	0d.
	Interest for 1 year 131 days, . .	36	13	9¾
	Amount,	636	13	9¾
	Paid on the 27th July 1862, . .	250	0	0
	Balance,	386	13	9¾
	Interest for 1 year 113 days, . .	22	15	9¼
	Amount,	409	9	7
	Paid on the 17th November 1863, .	225	0	0
	Balance,	184	9	7
	Interest for 99 days, . . .	2	5	0¼
	Amount,	186	14	7¼
	Paid on the 24th February 1864, .	175	0	0
	Balance,	11	14	7¼
	Interest for 1 year 95 days, . .	0	13	3¾
	Amount,	12	7	11
	Paid the amount, 30th May 1865,	£12,	7s.	11d.

19.	Lent 1st Jan. 1859, at 4¾ per cent.	£1000,	0s.	0d.
	Interest for 1 year 144 days, . .	66	4	9½
	Amount,	1066	4	9½
	Received on the 25th May 1860, .	400	0	0
	Balance,	666	4	9½
	Interest for 1 year 101 days, .	40	8	0¾
	Amount,	706	12	10¼
	Received on the 3d September 1861,	350	0	0
	Balance,	356	12	10¼
	Interest for 1 year 174 days, . .	25	0	4
	Amount,	381	13	2¼
	Recd. the amount, 24th Feb. 1863,	£381,	13s.	2¼d.

ANNUITIES.

ANNUITIES CERTAIN.

PROBLEM I.—Table III.

1. Amt. of £1 per an. for 4 ye., at 4 p. c., = £4·2465, and £4·2465 × 40 = £169·86.
2. $(1{\cdot}02^{8}-1)\div{\cdot}02$ = £·171659 ÷ ·02 = £8·5829, and £8·5829 × 20 = £171·658.
3. $(1{\cdot}01^{16}-1)\div{\cdot}01$ = £·172579 ÷ ·01 = £17·2579, and £17·2579 × 10 = £172·2579.
4. Amt. of £1 per an. for 10 ye., at 5 p. c., = £12·5779, and £12·5779 × 60 = £754·674.

PROB. II.—Table IV.

5. Pres. val. of £1 per an. for 5 ye., at 5 p. c., = £4·3295, and £4·3295 × 100 = £432·95.
6. Pres. val. of £1 per an. for 20 ye., at 4 p. c., = £13·5903, and £13·5903 × 40 = £543·612.
7. $(1{\cdot}02^{12}-1)\div{\cdot}02 = (1{\cdot}268242-1)\div{\cdot}02$ = £13·4121; then, £13·4121 ÷ 1·268242 = £10·57534, and £10·57534 × 80 = £846·0272.
8. $(1{\cdot}0075^{20}-1)\div{\cdot}0075 = (1{\cdot}161184-1)\div{\cdot}0075$ = £21·4912; then, £21·4912 ÷ 1·161184 = £18·508, and £18·508 × 30 = £555·240.

PROB. III.

9. Pres. val. of £1 per an. for 21 ye., at 5 p. c., by Tab. IV., = £12·8212, and pres. val. of £1 for 5 ye., at 5 p. c., by Tab. II., = £·783526; then, £12·8212 × ·783526 × 80 = £803·659.
10. Pres. val. of £1 per an. for 20 ye., at 5 p. c., by Tab. IV., = £12·4622, and pres. val. of £1 for 10 ye., at 5 p. c., by Tab. II., = £·613913; then, £12·4622 × ·613913 × 500 = £3825·353.
11. Pres. val. of £1 per an. for 10 ye., at 4 p. c., by Tab. IV., = £8·1109, and pres. val. of £1 for 6 ye., at 4 p. c., by Tab. II. = £·790315; then, £8·1109 × ·790315 × 100 = £641·0166.

12. Pres. val. of £1 per an. for 15 ye., at 3 p. c., by Tab. IV., = £11·9379, and pres. val. of £1 for 12 ye., at 3 p. c., by Tab. II., = £·70138; then, £11·9379 × ·70138 × 50 = £418·650.

Prob. IV.

13. £250 ÷ ·05 = £5000
14. £500 ÷ ·04 = £12500
15. £1200 ÷ ·045 = £26666$\frac{2}{3}$
16. £6000 ÷ ·05 = £120000

Prob. V.

17. £5000 × ·05 = £250
18. £1000 × ·045 = £45
19. £2000 × ·05 = £100
20. £2500 × ·04 = £100

Prob. VI.

21. £250 ÷ 4166$\frac{2}{3}$ = ·06, or 6 per cent.
22. £60 ÷ 1000 = ·06
23. £1000 ÷ 25000 = ·04
24. £500 ÷ 12000 = ·04$\frac{1}{6}$

Prob. VII.

25. £25000 ÷ 15 = £1666$\frac{2}{3}$
26. £12000 ÷ 20 = £600
27. £8176, 18s. 9d. ÷ 18 = £454, 5s. 5$\frac{3}{4}$d. $\frac{1}{3}$
28. £15896, 11s. 8d. ÷ 16 = £993, 10s. 8$\frac{3}{4}$d.

Prob. VIII.

29. £25000 ÷ £1666$\frac{2}{3}$ = 15 years.
30. £8000 ÷ £500 = 16 yrs.
31. £12000 ÷ £666$\frac{2}{3}$ = 18 ye.
32. £20000 ÷ £1500 = 13$\frac{1}{3}$ years.

Prob. IX.

33. (20 + 1) ÷ 20 = £1·05, or 5 per cent.
34. (15 + 1) ÷ 15 = £1·06$\frac{2}{3}$
35. 19$\frac{1}{3}$ ÷ 18$\frac{1}{3}$ = £1·05$\frac{5}{11}$
36. 13$\frac{2}{3}$ ÷ 12$\frac{2}{3}$ = 1·07$\frac{17}{19}$

Prob. X.

37. 1 ÷ ·05 = 20 years.
38. 1 ÷ ·045 = 22$\frac{2}{9}$ years.
39. 1 ÷ ·0375 = 26$\frac{2}{3}$ years.
40. 1 ÷ ·085 = 11$\frac{13}{17}$ years.

Prob. XI.

41. Pres. val. of perpetuity = £250 ÷ ·05 = £5000, and pres. val. of £1 for 6 ye., at 5 p. c., by Tab. II., = £·746215; then, £5000 × ·746215 = £3731·075.

42. Pres. val. of perpet. = £500 ÷ ·04 = £12500, and pres. val. of £1 for 5 ye., at 4 p. c., by Tab. II., = £·821927; then, £12500 × ·821927 = £10274·0875.

43. Pres. val. of perpet. = £350 ÷ ·04 = £8750, and pres. val. of £1 for 8 ye., at 4 p. c., by Tab. II., = £·73069; then, £8750 × ·73069 = £6393·5375.

44. Pres. val. of perpet. $= £1200 \div \cdot045 = £26666\cdot\dot{6}$, and amt. of £1 for 10 ye., at 4·5 p.c., $= 1\cdot045^{10} = £1\cdot55297$; then, $£26666\cdot\dot{6} \div £1\cdot55297 = £17171\cdot398$.

Prob. XII.

45. Amt. of £1 for 6 ye., at 4 p.c., by Tab. I., $= £1\cdot26532$; then, $£1240\cdot5 \times 1\cdot26532 \times \cdot04 = £62\cdot7852$.
46. Amt. of £1 for 10 ye., at 5 p.c., by Tab. I., $= £1\cdot62889$; then, $£8000 \times 1\cdot62889 \times \cdot05 = £651\cdot556$.
47. Amt. of £1 for 8 ye., at 4·5 p.c., $= 1\cdot045^8 = £1\cdot4221$; then, $£6150 \times 1\cdot4221 \times \cdot045 = £393\cdot566$.
48. Amt. of £1 for 4 ye., at 5 p. c., by Tab. I., $= £1\cdot21551$; then, $£100000 \times 1\cdot21551 \times \cdot05 = £6077\cdot55$.

CONTINGENT OR LIFE ANNUITIES.

Problem I.

1. The sum of all the living in Tab. V., from 50 to 96 inclusive, is 52842, and the number alive at 50 is 2857; then, $(52842 \div 2857) - \cdot5 = 18\cdot4956 - \cdot5 = 17\cdot9956$ years.
2. $(121798 \div 4310) - \cdot5 = 28\cdot2594 - \cdot5 = 27\cdot7594$ ye.
3. $(149233 \div 4760) - \cdot5 = 31\cdot3515 - \cdot5 = 30\cdot8515$ ye.
$(105008 \div 4010) - \cdot5 = 26\cdot1865 - \cdot5 = 25\cdot6865$ 〃
$(68302 \div 3248) - \cdot5 = 21\cdot0289 - \cdot5 = 20\cdot5289$ 〃
$(5680 \div 832) - \cdot5 = 7\cdot0433 - \cdot5 = 6\cdot5433$ 〃
4. $(228599 \div 5675) - \cdot5 = 40\cdot2818 - \cdot5 = 39\cdot7818$ ye.
$(174155 \div 5132) - \cdot5 = 33\cdot9351 - \cdot5 = 33\cdot4351$ 〃
$(126183 \div 4385) - \cdot5 = 28\cdot776 - \cdot5 = 28\cdot276$ 〃
$(85708 \div 3635) - \cdot5 = 23\cdot5785 - \cdot5 = 23\cdot0785$ 〃

Prob. II.

5. Number alive at 60, by Tab. V., is 2038, and at 40 is 3635; hence, the probability is $\frac{2038}{3635}$
6. Number alive at 35 is 4010, and at 25 is 4760, then $\frac{4010}{4760}$ is the probability that a person aged 25 shall attain the age of 35, and $\frac{3635}{4385}$ is the probability that

a person aged 30 shall live 10 years longer, hence $\frac{4010}{4760}\times\frac{3635}{4385}=\frac{401}{476}\times\frac{727}{877}=\frac{291527}{417452}$ the probability that both shall live 10 years.

7. $\frac{2038}{4760}\times\frac{2038}{4010}\times\frac{2038}{3635}=\frac{1019}{1190}\times\frac{1019}{2005}\times\frac{1019}{3635}=\frac{1058089859}{8672928250}$ the probability.

8. $\frac{2038}{5132}\times\frac{2038}{4385}\times\frac{2038}{3635}\times\frac{2038}{2857}=\frac{4312774265284}{58426639736225}$ the probability.

PROB. III.

9. $\frac{2448}{4385}+\frac{1232}{3248}-\left(\frac{2448}{4385}\times\frac{1232}{3248}\right)=\frac{496944+337645-188496}{890155}=\frac{834589-188496}{890155}=\frac{646093}{890155}$ the probability.

10. $\frac{2857}{5132}+\frac{2038}{4385}-\left(\frac{2857}{5182}\times\frac{2038}{4385}\right)=\frac{12527945+10459016-5822566}{22503820}=\frac{2298661-5822566}{22503820}=\frac{17164395}{22503820}=\frac{3432879}{4500764}$ the probability.

11. $\frac{3635}{4385}+\frac{2038}{2857}-\left(\frac{3635}{4385}\times\frac{2038}{2857}\right)=\frac{2077039+1787326-1481626}{2505560}=\frac{2382739}{2505589}$ the probability.

12. $\frac{3635}{5423}+\frac{3635}{5132}-\left(\frac{3635}{5423}\times\frac{3635}{5132}\right)=\frac{18654820+19712605-13213225}{27830836}=\frac{25154200}{27830836}=\frac{6288550}{6957709}$ the probability.

PROB. IV.

13. Val. of an annuity of £1 on a life of 35, at 4 p. c., by Tab. VII., is £14·041; then, £14·041 × 80 = £1123·28.
14. Val. of £1 annuity on a life of 50, at 5 p. c., is £10·269; then, £10·269 × 100 = £1026·9.
15. £4500 × ·04 = £180 yearly rent of the stock; val. of £1 annuity on a life of 40, at 5 p. c., is £11·837; then, £11·837 × 180 = £2130·66.
16. Val. of an annuity of £1 on a life of 22, at 5 p. c., is £13·833; then, £13·833 × 250 = £3458·25.
17. Val. of an annuity of £1 for 20 ye., at 5 p. c., by Tab. III., is £33·066, do. on a life of 35 ye., at 5 p. c.,

£12·502; hence, (£33·066 — £12·502) × 40 = £20·564 × 40 = £822·56 diff.

18. Val. of an annuity of £1 for 30 ye., at 4 p. c., is £56·0849, on a life of 25, £15·440; hence, (£56·0849 — £15·440) × 100 = £40·6449 × 100 = £4064·49.

Prob. V.

19. Val. of an annuity of £1 on a life of 25, at 5 p. c., is £13·567; then, £3000 ÷ 13·567 = £221·1248.

20. Val. of an annuity of £1 on a life of 35, at 4 p. c., is £14·041; then, £5000 ÷ 14·041 = £356·1.

21. £6000 stock at 92½ p. c. is £5550, less brok. ⅛ p. c. on the stock £7·5 = £5542·5 expended upon the annuity; val. of an annuity of £1 on a life of 50, at 4 p. c., is £11·265; then, £5542·5 ÷ 11·265 = £492·011.

22. Val. of an annuity of £1 on a life of 30, at 5 p. c., is £13·072, and on a life of 56, £9·193; hence, (£13·072 — £9·193) × 150 = £3·879 × 150 = £581·85.

23. Val. of an annuity of £1 on a life of 60, at 4 p. c., is £9·040, and on a life of 30, £14·783; hence, (£14·783 × 100) ÷ 9·040 = £163·529.

Prob. VI.

24. Probability that a life of 60 years shall continue 10 years longer is $\frac{1232}{2038} = \frac{616}{1019}$. P. V. of £1, due 10 ye. hence, at 5 p. c., by Tab. II., is £·613913. Val. of an annuity of £1 on a life of 70 years, at 5 p. c., is £6·023, and on a life of 60, £8·392; hence, £8·392 — (£6·023 × ·613913 × $\frac{616}{1019}$) × 40 = (£8·392 — £2·235) × 40 = £6·157 × 40 = £246·28.

25. Prob. that a life of 30 shall continue 20 ye. is $\frac{2857}{4385}$. P. V. of £1 due 20 ye. hence, at 4 p. c., is £·456387, and val. of £1 ann. on a life aged 50, £11·265, also on a life aged 30, £14·783; hence, £14·783 — (£11·265 × ·456387 × $\frac{2857}{4385}$) × 100 = (£14·783 — £3·349) × 100 = £1143·4.

26. Prob. that a life of 40 shall continue 12 ye. is $\frac{2694}{3635}$. P. V. of £1 due 12 ye. hence, at 4 p. c., is £·624597, and val. of £1 ann. on a life of 52, £10·850, also on a life aged 40, £13·197; hence, £13·197 — (£10·850 × ·624597 × $\frac{3684}{5055}$) × 80 = (£13·197 — £5·022) × 80 = £8·175 × 80 = £654.

27. Prob. that a life of 50 shall continue 15 ye. is $\frac{1632}{2857}$. P. V. of £1 due 15 ye. hence is £·641862, at 3 p. c., and val. of £1 ann. on a life of 65 is £8·305, also on a life of 50, £12·436; hence, £12·436 — (£8·305 × ·641862 × $\frac{1632}{2857}$) × 120 = (£12·436 — £3·045) × 120 = £9·391 × 120 = £1126·92.

PROB. VII.

28. Val. of a life of 10, at 5 p. c., £15·139, and of 25, £13·567, val. of joint lives £11·627; hence, (£15·139 + £13·567 — £11·627) × 80 = £17·079 × 80 = £1366·32.

29. Val. of a life of 20, at 4 p. c., £16·035, and of 45, £12·283, val. of joint lives £10·330; hence, (£16·035 + £12·283 — £10·330) × 100 = £1798·8

30. Val. of a life of 35, at 5 p. c., £12·502, and of 40, £11·837, val. of joint lives £9·331; hence, (£12·502 + £11·837 — £9·331) × 60 = £15·008 × 60 = £900·48.

31. Val. of a life of 30, at 4 p. c., £14·783, and of 50, £11·265, val. of joint lives £9·321; hence, (£14·783 + £11·265 — £9·321) × 120 = £16·727 × 120 = £2007·24.

PROB. VIII.

32. The val. of the joint lives 40 and 35, at 5 p. c., is £9·331, which is nearly equal to the value of a single life of 55, and the val. of the joint lives 20 and 55 is £8·216; then, £8·216 × 500 = £4108.

33. Val. of joint lives 15 and 55, at 5 p. c., is £8·403 = single life of 60, and val. of joint lives 10 and 60 is £7·750; then, £7·750 × 300 = £2325.

34. Val. of joint lives 25 and 35, at 5 p. c., is £10·175 = a single life of 50, and val. of joint lives 15 and 50 is £9·076; then, £9·076 × 460 = £4174·96.

35. Val. of joint lives 35 and 50, at 5 p. c., is £8·415 = a single life of 60, and val. of joint lives of 20 and 60 is £7·463; then, £7·463 × 360 = £2686·68.

Prob. IX.

36. The three single lives, at 4 p. c., are worth £16·035 + £14·783 + £13·197 = £44·015. The val. of each pair of joint lives is £11·873 + £10·924 + £10·490 = £33·287, the difference of the sums, £10·728, and £10·728 + £8·986 the value of the three joint lives = £19·714; then, £19·714 × 500 = £9857.

37. (£16·792 + £15·440 + £14·041) — (£12·630 + £11·787 + £11·217) + £9·738 = £20·377; then, £20·377 × 100 = £2037·7.

38. Val. of joint lives 30 and 60, at 4 p. c., is £7·802 = a single life of 65, and val. of joint lives 20 and 65 = £6·986 = value of the three joint lives; then, (£16·035 + £14·783 + £9·040) — (£11·873 + £7·995 + £7·802) + £6·986 = £19·174, and £19·174 × 150 = £2876·1.

39. (£15·440 + £14·041 + £12·283) — (£11·217 + £10·160 + £9·706) + £8·313 = £18·994, and £18·994 × 250 = £4748·5.

Prob. X.

40. Val. of each pair of joint lives, £11·873, £10·924, £10·490, and val. of the three joint lives, £8·986; hence, £11·873 + £10·924 + £10·490 — £17·972 = £15·315; then, £15·315 × 150 = £2297·25.

41. £13·355 + £12·586 + £11·873 — £20·876 = £16·938, and £16·938 × 200 = £3387·6.

42. (£11·313 × 3) — £18·442 = £15·497, and £15·497 × 300 = £4649, 2s.

43. £12·630 + £11·787 + £11·217 — £19·476 = £16·158, and £16·158 × 90 = £1454·22.

Prob. XI.

44. Val. of a life of 25, at 5 p. c., £13·567, and val. of joint lives, £9·771; then, (£13·567 — £9·771) × 50 = £3·796 × 50 = £189·8.

45. Val. of a life of 30, at 5 p. c., £13·072 — £8·596 val. of joint lives, = £4·476, and £4·476 × 100 = £447·6.

46. Val. of a life of 20, at 5 p. c., £14·007 — £9·937 val. of the joint lives, = £4·070, and £4·070 × 80 = £325·6.

47. Val. of a life of 25, at 5 p. c., £13·567 — £8·739 val. of the joint lives, = £4·828, and £4·828 × 150 = £724·2.

PROB. XII.

48. Val. of a life of 20, at 4 p. c., £16·035 + £8·986 val. of the three joint lives, = £25·021, then joint lives of 20 and 30, £11·873 + £10·924 joint lives of 20 and 40, = £22·797; hence, (£25·021 — £22·797) × 70 = £2·224 × 70 = £155·68.

49. Val. of a life of 15, at 4 p. c., £16·792 + £9·738 val. of three joint lives, = £26·530; then, £26·530 — £24·417 sum of the values of the two pair of joint lives, = £2·113, and £2·113 × 80 = £169·04.

50. Val. of joint lives of 50 and 65, at 5 p. c., = £5·897 = a single life of 70, and val. of joint lives 25 and 70 = £5·489 val. of the three joint lives; then, val. of a life of 25, £13·567 + £5·498 — £15·254 sum of the two pairs of joint lives, = £3·802, and £3·802 × 50 = £190, 2s.

51. Val. of joint lives of 50 and 65, at 5 p. c., = £5·897 = a single life of 70, and val. of joint lives 15 and 70 = £5·631; then, £5·631 + £14·588 val. of a life of 15, = £20·219, and £20·219 — £15·781 sum of the two pairs of joint lives, = 4·438 years' purchase.

PROB. XIII.

52. £100 ÷ 4 = £25 the perpetuity, val. of a life of 45 = £12·283, and (£25 — £12·283) × 2500 ÷ 26 = £31792·5 ÷ 26 = £1222·78846 val. in one payment; then, £1222·78846 ÷ 13·283 = £92·0566, val. in annual payments.

53. £100 ÷ 3 = £33⅓ the perpetuity, val. of a life of 50 = £12·436, and (£33·333 — £12·436) × 1500 ÷ 34·333 = £31345·5 ÷ 34·333 = £912·9846 val. in one payment; then, £912·9846 ÷ 13·436 = £67·9506 in annual payments.

£100 ÷ 5 = £20 the perpetuity, val. of joint lives

£9·135; then, (£20—£9·135)×2000÷21=£21730 ÷21 = £1034·7619, val. in one payment.

55. Val. of a life of 25, at 5 p. c., £13·567, of 30, £13·072, and of joint lives £10·499; hence, £13·567+£13·072 —£10·499=£16·140, val. of the longer of the two lives; and (£20—£16·140)×1000÷21=£3860÷21=£183·8095, val. in one payment.

56. £100÷4=£25 perpetuity, val. of the three joint lives, £10·438; then, (£25—£10·438)×500÷26=£7281 ÷26 = £280·03846, val. in one payment.

57. £100÷4=£25 perpetuity; then, £25—{(£16·792+£15·440 + £14·041) — (£12·630 + £11·787 + £11·217)+£9·738}=£25—£46·273+£35·634—£9·738=£25—£20·377=£4·623, and £4·623×1500÷26 = £266·712, val. in one payment.

58. £100÷4=£25 perpetuity, val. of a life of 30, £14·783; then, (£25—£14·783) × 500 = £5108·5, val. of the estate.

59. £100÷4=£25 perpetuity, val. of the two joint lives £9·110; then, (£25—£9·11)×1500=£23835, value.

60. £100÷4=£25 perpetuity, val. of a life of 35=£14·041, of 45 = £12·283 and of joint lives £9·706; then, £25—{(£14·041+£12·283)—£9·706}=£25—£26·324+£9·706=£8·382; hence, £8·382 × 1500 = £12576, value.

61. £100÷4=£25 perpetuity, val. of three joint lives = £10·438; hence, £25—£10·438×2000=£29124, val.

62. £100 ÷ 4 = £25 perpetuity, £17·525 + £16·035 + £14·783 = £48·343, sum of the val. of the single lives, also £13·355+£12·586+£11·873 = £37·814, sum of the val. of each pair of joint lives, and £10·438 val. of the three joint lives; hence, £25—(£48·343—£37·814 + £10·438) = £25 — £20·967 = £4·033; and £4·033 × 2000 =£8066, value.

63. £100 ÷ 4 = £25 perpetuity, £14·041 + £13·197 = £27·238 sum of the val. of the single lives, and £10·196 value of the joint lives; hence, £25 — (£27·238—£10·196)=£7·958, and £7·958×3000÷26 = £918·231, val. in one payment; then, £918·231 ÷18·042=£50·89, val. in yearly payments.

PROMISCUOUS EXERCISES.

1. Val. of a life of 20, at 5 p. c., £14·007, val. of joint lives, £10·989; then,(£14·007—£10·989)×150 = £452·7, present value.
2. Val. of a life of 30, at 4 p. c., £14·783, val. of the joint lives, £10·490; then, (£14·783—£10·490) × 80 = £343·44, val. in one payment, and £343·28 ÷ 11·49 = £29·89, annually during marriage.
3. Val. of a life of 40, at 4 p. c., £13·197, val. of the joint lives £9·381; then, (£13·197—£9·381) × 120 ÷ 10·381 = £457·92 ÷ 10·381 = £44·11135, annual payment during marriage.
4. Val. of a life of 25, at 5 p. c., £13·567, val. of the joint lives £10·499; then, (£13·567—£10·499) × 100 ÷ 11·499 = £306·8 ÷ 11·499 = £26·6806, annual payment during marriage.
5. £100 ÷ 5 = £20 perpetuity, val. of a life of 45, £11·105; then, (£20 — £11·105) × 1000 ÷ 21 = £8895 ÷ 21 = £423·$\dot{5}7142\dot{8}$ in one payment, and £423·571428 ÷ 12·105 = £34·9914, annually during his life.
6. £100 ÷ 4 = £25 perpetuity, val. of a life of 40, £13·197; then, (£25—£13·197) × 100 ÷ 26 = £45·39615 in one payment, and £45·39615 ÷ 14·197 = £3·19759, annually.
7. Val. of joint lives 40 and 50, at 4 p. c., = £8·834, and £8·834 × 30 = £265·02.
8. £100 ÷ 5 = £20 the perpetuity, val. of a life of 40 = £11·837, and (£20 — £11·837) × 3000 ÷ 21 = £8·163 × 3000 ÷ 21 = £1166·1 val. in one payment; then, £1166·1 ÷ 12·837 = £90·839 annual payment.
9. Val. of £1 ann. on the joint lives 30 and 35, at 4 p. c., is £10·948, which is nearly equal to a life of 51½ ye. by Tab. VII.; then, val. of joint lives 25 and 51½, by Tab. VIII., is £9·488 — (£9·488 — £8·754) × 1½ ÷ 5 = £9·488 — £·220 = £9·268, and £9·268 × 150 = £1390·2 the value.
10. Val. of £1 ann. on the three, singly and jointly, is £15·440 + £14·783 + £11·265 + £8·076 = £49·564;

also, val. of the pairs £11·618 + £9·488 + £9·321 = £30·427; then, (£49·564 — £30·427) × 200 = £19·137 × 200 = £3827·4 the payment.

11. £100 ÷ 4 = £25 the perpetuity, and val. of £1 per ann. on a life aged 54 ye., at 4 p. c., = £10·422; then, (£25 — £10·422) × 450 = £14·578 × 450 = £6560·1 the value.

12. Sum of the val. of the single lives £11·837 + £11·105 = £22·942, and £8·643 val. of the joint lives; hence, (£22·942 — £8·643) × 20 = £285·98.

13. Val. of a life of 30, at 4 p. c., £14·783, val. of joint lives £10·948; then, (£14·783 — £10·948) ÷ 11·948 = £3·835 ÷ 11·948 = £·3209, annually.

14. Val. of a life of 25, at 5 p. c., £13·567, val. of the joint lives, £10·175; then, (£13·567 — £10·175) × 40 ÷ 13·502 = £135·68 ÷ 13·502 = £10·0489, annually during his life.

15. Val. of a life of 35, at 4 p. c., £14·041, value of the equal joint lives £10·612; then (£14·041 — £10·612) × 30 = £102·870, pres. value of the annuity; hence, (£102·870 — £12) ÷ 11·612 = £7·825, annual payment during marriage.

16. Probability that both will be alive at the end of five years, $\frac{3635}{4010} \times \frac{3635}{4010} = \frac{528529}{643204}$, pres. val. of £1, due 5 ye. hence, at 4 p. c., £·821927, val. of a life of 40 = £13·197, val. of two joint lives each 40 = £9·820; hence, £·821927 × 528529 × (13·197 — 9·820) ÷ 643204 = £1467006·23356 ÷ 643204 = £2·2808, pres. val. of an annuity of £1; then, {£2·2808 × 30 — £12} ÷ 11·612 = £56·424 ÷ 11·612 = £4·8591, annually during marriage.

17. Val. of a life of 35, at 4 p. c., = £14·041, val. of two joint lives each 35 = £10·612, val. of a life of 25 = £15·440, val. of two joint lives of 25 and 35 = £11·217; then, (£15·440—£11·217) — (£14·041 — £10·612) = £4·223 — £3·429 = £·794, and £14·041 × ·794 × 5 ÷ 3·429 = £55·74277 ÷ 3·429 = £16·256, fine.

18. Val. of a life of 35, at 4 p. c., = £14·041, val. of a life of 45 = £12·283; then, (£14·041 — £12·283) × 5 = £8·79, fine.

DUODECIMAL MULTIPLICATION.

1. 48 ft. 6 in.
3 4
145 6
16 2
161 8
Or 161 s.ft. 96 s.in.

2. 98 ft. 3 in.
5 6
491 3
49 1 6
540 4 6
Or 540 s.ft. 54 s.in.

3. 548 ft. 5 in.
7 11
3838 11
502 8 7
4341 7 7
4341 s. ft. 91 s. in.

4. 141 ft. 6 in.
6 10
849 0
117 11
966 11
966 s. ft. 132 s. in.

5. 891 ft. 5 in.
9 8
8022 9
594 3 4
8617 0 4
8617 s. ft. 4 s. in.

6. 146 ft. 3 in.
8 9
1170 0
109 8 3
1279 8 3
1279 s. ft. 99 s. in.

7. 678 ft. 4 in. 8 pt.
7 11 0
4748 8 8
621 10 3 4
5370 6 11 4
5370 s. ft. 83⅓ s. in.

8. 37 ft. 6 in. 9 pt.
11 10 0
413 2 3
31 3 7 6
444 5 10 6
444 s. ft. 70½ s. in.

9. 35 ft. 11 in. 10 pt.
10 11 0
359 10 4
32 11 10 2
392 10 2 2
392 s. ft. 122⅙ s. in.

10. 67 ft. 8 in. 11 pt.
9 11 0
609 8 3
62 1 2 1
671 9 5 1
671 s.ft. 113$\frac{1}{12}$ s.in.

11. 87 ft. 6 in. 8 pt.
11 10 0
963 1 4
72 11 6 8
1036 0 10 8
1036 s. ft. 10⅔ s. in.

12. 83 ft. 4 in. 5 pt.
9 10 0
750 3 9
69 5 8 2
819 9 5 2
819 s. ft. 113⅙ s. in.

13. 87 ft. 11 in. 11 pt.
11 11 0
967 11 1
80 7 11 1
1048 7 0 1
1048 s. ft. 84$\frac{1}{12}$ s. in.

14. 78 ft. 11 in. 4 pt.
7 8 3
552 7 4
52 7 6 8
1 7 8 10
606 10 7 6
606 s. ft. 127½ s. in.

15. 63 ft. 4 in. 8 pt.
8 9 6
507 1 4
47 6 6 0
2 7 8 4
557 3 6 4
557 s. ft. 42⅓ s. in.

16.

ft.	in.	pt.		
91	4	9		
9	7	9		
822	6	9		
53	3	9	3	
5	8	6	6	9
881	7	0	9	9

881 s. fc. 84$\frac{13}{16}$ s. in.

17.

ft.	in.	pt.		
33	0	8		
7	6	8		
231	4	8		
16	6	4	0	
1	10	0	5	4
249	9	0	5	4

249 s. ft. 108$\frac{4}{9}$ s. in.

18.

ft.	in.	pt.		
55	8	7		
72	0	8		
4011	6	0		
3	1	1	8	8
4014	7	1	8	8

4014 s. ft. 85$\frac{13}{18}$ s. in.

19.

ft.	in.	pt.		
77	11	8		
37	11	8		
2884	11	8		
71	5	8	4	
4	3	11	9	4
2960	9	4	1	4

2960 s. ft. 112$\frac{1}{9}$ s. in.

20.

ft.	in.	pt.	
88	10	4	
48	10	0	
4265	4	0	
74	0	7	4
4339	4	7	4

4339 s. ft. 55$\frac{1}{3}$ s. in.

21.

ft.	in.	pt.		
73	5	8		
33	6	4		
2424	7	0		
36	8	10	0	
2	0	5	10	8
2463	4	3	10	8

2463 s. ft. 51$\frac{8}{9}$ s. in.

22.

ft.	in.	pt.		
96	8	9		
55	11	9		
5320	1	3		
88	8	0	3	
6	0	6	6	9
5414	9	9	9	9

5414 s. ft. 117$\frac{13}{16}$ s. in.

ARTIFICERS' MEASURING.

PROBLEM I.

1. 12 ft. 6 in.

1	3	
12	6	
3	1	6
15	7	6

15 s. ft. 90 s. in.

2. 57 ft. 8 in. 0 pt.

2	7	3
115	4	0
33	7	8
1	2	5
150	2	1

150 s. ft. 25 s. in.

3. 16 ft. 9 in.

2	2	
33	6	
2	9	6
36	3	6

36 s. ft. 42 s. in.

4. 20 ft. 4 in.
2 2
40 8
3 4 8
44 0 8
44 s. ft. 8 s. in.

5. 30 ft. 8 in.
3 4
92 0
10 2 8
102 2 8
102 s. ft. 32 s. in.

6. 18 ft. 10 in. 0 pt.
1 4 3
18 10 0
6 3 4
0 4 $8\frac{1}{2}$
25 6 $0\frac{1}{2}$
25 s. ft. $72\frac{1}{2}$ s. in.

PROB. II.

1. ft. in.
1 10
1 3
1 10
0 5 6
2 3 6
27 0 0
61 10 6
61 c. ft. 1512 c. in.

2. 1 1
1 1
1 1
0 1 1
1 2 1
24 6 0
28 2 0
0 7 0 6
28 9 0 6
28 c. ft. 1302 c. in.

3. ft. in.
13 8
7 9
95 8
10 3
105 11
3 11
317 9
97 1 1
414 10 1
414 c. ft. 1452 c. in.

4. ft. in. pt.
58 6 0
9 5 4
526 6 0
24 4 6
1 7 6
552 6 0
7 8 3
3867 6 0
368 4 0
11 6 1 6
4247 4 1 6
4247 c. ft. 594 c. in.

5. ft. in.
4 8
3 11
14 0
4 3 4
18 3 4
2 3 0
36 6 8
4 6 10
41 1 6
41 c. ft. 216 c. in.

6.
ft. in. pt.
2 3 2
0 9 8
1 8 4 6
0 1 6 1 4
1 9 10 7 4
19 4 6 0 0
34 7 9 7 4
0 8 2 5 9
35 4 0 1 1
35 c. ft. $577\frac{1}{12}$ c. in.

PROB. III.

1. 14 ft. ÷ 4 = 3 ft. 6 in., then, 3 ft. 6 in. × 3 ft. 6 in. × 9 ft. 6 in. = 12 s. ft. 3 in. × 9 ft. 6 in. = 116 c. ft. 648 c. in. by Rule; also, 14 ft. ÷ 5 = 2·8 ft., then 2·8 ft. × 2·8 ft. × 19 ft. = 148·96 c. ft. by Rule II.

2. (14 ft. + 2 ft.) ÷ (2 × 4) = 2 ft., then 2 ft. × 2 ft. × 24 ft. = 96 c. ft.; or, 8 ft. ÷ 5 = 1·6 ft., then 1·6 ft. × 1·6 ft. × 48 ft. = 122·88 c. ft.

3. 7 ft. ÷ 4 = 1 ft. 9 in., then 1 ft. 9 in. × 1 ft. 9 in. × 50 ft. = 3 s. ft. 0 in. 9 pt. × 50 ft. = 153 c. ft. 216 c. in.; or, 7 ft. ÷ 5 = 1·4 ft., then 1·4 ft. × 1·4 ft. × 100 ft. = 196 c. ft.

4. (5 ft. + 1 ft. 6 in.) ÷ (2 × 4) = 9 in. 9 pt, then 9 in. 9 pt. × 9 in. 9 pt. × 48 ft. = 0 s. ft. 7 in $11\frac{1}{16}$ pt. × 48 ft. = 31 c. ft. 1188 c. in.; or, 6·5 ft. ÷ 10 = ·65 ft., then ·65 ft. × ·65 ft. × 96 ft. = 40·56 c. ft.

5. 64 in. ÷ (12 × 4) = 1 ft. 4 in.; 56 in. ÷ (12 × 4) = 1 ft. 2 in.; 52 in. ÷ (12 × 4) = 1 ft. 1 in., and 46 in. ÷ (12 × 4) = 11 in. 6 pt.; then {(1 ft. 4 in. × 1 ft. 4 in.) + (1 ft. 2 in. × 1 ft. 2 in.) + (1 ft. 1 in. × 1 ft. 1 in.) + (11 in. 6 pt. × 11 in. 6 pt.)} = (1 s. ft. 9 in. 4 pt. + 1 s. ft. 4 in. 4 pt. + 1 ft. 2 in. 1 pt. + 0 s. ft. 11 in. $0\frac{1}{4}$ pt.) × 8 ft. = 5 s. ft. 2 in. $9\frac{1}{4}$ pt. × 8 ft. = 41 c. ft. 1464 c. in. by Rule I. Or, since 64 in. ÷ 5 = 12·8 in.; 56 in. ÷ 5 = 11·2 in.; 52 in. ÷ 5 = 10·4 in., and 46 in. ÷ 5 = 9·2 in.; then (12·8 in. × 12·8 in. ÷ $\frac{144}{16}$) + (11·2 in. × 11·2 in. ÷ 9) + (10·4 in. × 10·4 in. ÷ 9) + (9·2 in. × 9·2 in. ÷ 9) = $18{\cdot}20\dot{4}$ c. ft. + $13{\cdot}93\dot{7}$ c. ft. + $12{\cdot}01\dot{7}$ c. ft. + $9{\cdot}40\dot{4}$ c. ft. = $53{\cdot}56\dot{4}$ c. ft. by Rule II.

6. (9·43 ft. + 7·92 ft. + 6·15 ft. + 4·74 ft. + 3·16 ft.) ÷ 5 = 6·28 ft. mean girt, then 6·28 ft. ÷ 4 = 1·57 ft. and 1·57 ft. × 1·57 ft. × 17·25 ft. = 42·519525 c. ft. by Rule I.; again, 6·28 ft. ÷ 5 = 1·256 ft., and 1·256 ft. × 1·256 ft. × 34·5 ft. = 54·424992 c. ft. by Rule II.

EXERCISES.

1.

46	8		length
25	4		breadth
1166	8		
15	6	8	
1182	2	8	content

1182 s. ft. 32 s. in.

2.

74	10		length
53	3		breadth
3966	2		
18	8	6	
3984	10	6	content

3984 s. ft. 126 s. in.

3. 7 ft. 8 in. 6 pt.
4 9 8
30 10 0
5 9 $4\frac{1}{2}$
5 $1\frac{2}{3}$
37 0 $6\frac{1}{6}$ con.
37 s. ft. $6\frac{1}{6}$ s. in.

4.
38 ft. 6 in. = 462 in
23 4 = 280
129360 s. in.
11 ft. 9 in. = 141 in.
277·274)18239760 cub. in.
$65782\frac{60866}{138637}$ g.

5. $65782\frac{60866}{138637}$ gal.
8
$526259\frac{71017}{138637}$ gal.

6. 16 ft. 11 in.
3 9
50 9
12 8 3
63 5 3
2 10 4
126 10 6
52 10 4 6
1 9 1 9
181 6 0 3 cont.
181 c. ft. = 867 c. in.

7. 14 ft. 10 in.
2 11
29 8
13 7 2
43 3 2
7
302 10 2 content
302 s. ft. 122 s. in.

8. 2 ft. 2 in.
2 8
3 5
3 9
3 11
15 ft. 11 in.
12 8
191 0
10 7 4
201 7 4 content
201 s. ft. 88 s. in.

9. 36 ft. 7 in. 27 ft. 11 in.
22 10 19 7
804 10 530 5
30 $5\frac{5}{6}$ 16 $3\frac{5}{12}$
835 $3\frac{5}{6}$ 546 $8\frac{5}{12}$
546 $8\frac{5}{12}$
288 $7\frac{5}{12}$ difference =
288 s. ft. 89 s. in.

10. 7 ft. 9 in. 3 pt.
2 3 6
15 6 6
1 11 3 9
3 10 $7\frac{1}{2}$
17 9 8 $4\frac{1}{2}$
1 11 11 0
17 9 8 $4\frac{1}{2}$
16 3 10 $8\frac{1}{8}$
1 4 3 $10\frac{65}{96}$
35 5 10 $11\frac{29}{96}$ con.
35 c. ft. $851\frac{29}{96}$ c. in.

11.
45 ft. 6 in.
24 10
1092 0
37 11
9)1129 11
Ceiling, 125 s. yd. 4$\frac{11}{12}$ s. ft. at 1$\frac{1}{2}$d. = £0, 15s. 8$\frac{1}{4}$d. $\frac{5}{18}$
9 2 4$\frac{0}{4}$ $\frac{16}{27}$
£9, 18s. 0$\frac{1}{4}$d. $\frac{47}{54}$

45 ft. 6 in.
24 10
70 4 × 2
140 8
13 4
1828 8
46 10 8 p.
9)1875 6 8
208 s. yd. 3$\frac{5}{9}$ s. ft. at 10$\frac{1}{2}$d.
= £9, 2s. 4$\frac{0}{4}$d. $\frac{16}{27}$

12.
7 ft. 8 in
6 10
5 3
19 9 × 4
79 0
3 10
237 0
65 10
302$\frac{5}{6}$ s. ft. at 1s. 4d. =
£20, 3s. 9$\frac{1}{4}$d. $\frac{1}{3}$

13.
2 ft. 10 in.
2 6
2 6
7 10
2 0
15 8
14 2

2 ft. 6 in.
2 6
5 0
2 10
14 2

29$\frac{5}{6}$ s. ft. at 10 lb. per ft. =
298$\frac{1}{3}$ lb. at 38s. 9d. per cwt.
= £5, 3s. 2$\frac{1}{2}$d. $\frac{13}{28}$

14.
40 ft. 6 in.
50 0
9)2025 0
225 s. yd. at 3s. 7$\frac{1}{2}$d.
= £40, 15s. 7$\frac{1}{2}$d.

15.
7 ft. 8 in.
10 3
76 8
1 11
78 7
17 8$\frac{1}{2}$
9)60 10$\frac{1}{2}$
6 s. yd. 6$\frac{7}{8}$ s. ft. at 5d.
= 2s. 9$\frac{3}{4}$d. $\frac{5}{18}$

6 ft. 3 in.
2 10
12 6
5 2$\frac{1}{2}$
17 8$\frac{1}{2}$

16.
75 ft. 0 in.
15 9
1181 3
2
9)2362 6
262 s. yd. 4$\frac{1}{2}$ s. ft.

17.
46 ft. 7 in. 0 pt.
8 4 0
372 8 0
15 6 4
388 2 4
5
3)1940 11 8
9)646 11 10$\frac{2}{3}$
71 s. yd. 7 s. ft. 142$\frac{2}{3}$ s. in.

18. Side-walls, . $\overset{\text{ft.}}{(36+6)}\times 24\times 2 = 2016$ s.ft.
Gable-ends, . $(24+4)\times 24\times 2\times 1\frac{1}{2} = 2016$
Gables, . . $(28+7)\times 16\times 1\frac{1}{2} = 840$
Chimney-stalks, $(7+3)\times 8\times 2\times 1\frac{1}{2} = 240$
Levelling side-walls, $42\times 2 = 84$
5196 s.ft.

This at £2 per rood of 36 s. yd., = £32, 1s. $5\frac{3}{4}$d. $\frac{1}{9}$
110 ft. of vents, at 4d., = 1 16 8
£33, 18s. $1\frac{3}{4}$d. $\frac{1}{9}$

19. Side-walls, . $\overset{\text{ft.}}{(45+6)}\times 30\times 2\times 5\div 4 = 3825$ s. ft.
End-walls, . $28\times 30\times 2\times 1\frac{1}{2} = 2520$
Gables, . . $(28+5+8)\times 18\times 1\frac{1}{2} = 1107$
Chimney-stalks, $(8+3)\times 10\times 2\times 1\frac{1}{2} = 330$
7782 s. ft.

Deduct,
2 doors, $7\frac{1}{2}\times 4\times 2\times 5\div 4 = 75$ s. ft.
12 side-windows, $6\times 3\frac{1}{2}\times 12\times 1\frac{1}{4} = 315$
6 end do., $6\times 3\frac{1}{2}\times 6\times 1\frac{1}{2} = 189$
579
7203 s. ft.

This at £$10\frac{1}{3}$ per rood = £229, 14s. $6\frac{2}{27}$d. Levelling side-walls, $51\times 2\times 1\frac{1}{4} = 127\frac{1}{2}$ s. ft. at £2, 14s. per rood, is £1, 1s. 3d.; and £229, 14s. $6\frac{2}{27}$d. + £1, 1s. 3d. = £230, 15s. $9\frac{2}{27}$d.

MISCELLANEOUS QUESTIONS.

1. 36960 feet long
13200 feet broad
487872000
1050 feet deep
512265600000 cubic feet content
172 herrings in a cubic foot
815)88109683200000 herrings
$108110040736\frac{32}{163}$ barrels.

2. 20 shares of the 4th class

60 〃 = 15×4 of the 3d class

108 〃 = 9×4×3 of the 2d class

168 〃 = 7×4×3×2 of the 1st class

356)£20, 0s. 6d.

£0, 1s. 1½d. the share of the 4th

4

£0, 4s. 6d. 〃 of the 3d

3

£0, 13s. 6d. 〃 of the 2d

2

£1, 7s. 0d. 〃 of the 1st

3. 27¾ yards, at 2s. 11½d. = £4, 2s. $1\frac{0}{4}$d. ½

26 〃 at 15 10¾ = 20 13 3½

9½ 〃 at 15 7½ = 7 8 5¼

25 〃 at 5 3¾ = 6 12 9¾

52¼ 〃 at 6 8¼ = 17 9 $5\frac{0}{4}$ ¼

27¼ 〃 at 6 9¾ = 9 5 7½ ¾

Left with, 1 13 4

Value carried with him, £67, 5s. 0¼d. ½

Bill paid, £3, 17s. 6d.

Expenses, 0 13 6

4 11 0

Brought home with him, £62, 14s. 0¼d. ½

4\.

1100 qr., each 18st., is 19800 st. at 23½d. = £1938, 15s. 0d.

175 〃 〃 23 〃 is 4025 〃 at 13¼d. = 222 4 3¼

Value of the produce, £2160, 19s. 3¼d.

1100 qr. wheat, at 35s. 6d. = £1952, 10s.

175 〃 barley, 〃 22s. 0d. = 192 10

Expense of grinding, 4 13

2149 13 0

Gain, £11, 6s. 3¼d.

5\.

$\frac{4}{11}$ of $\frac{22}{3}$ of $\frac{185}{2}$s. ÷ 1803¾s. $= \frac{740}{3} \times \frac{4}{7215} = \frac{16}{117} = \cdot\dot{1}3675\dot{2}$

6. 6 ac., each $4\frac{1}{4}$ qr., = $25\frac{1}{2}$ qr., at 37s. = £47, 3s. 6d.
6 〃 $4\frac{9}{16}$ 〃 = $27\frac{3}{8}$ 〃 at 25s. = 34 4 $4\frac{1}{2}$
6 〃 $4\frac{1}{8}$ 〃 = $24\frac{3}{4}$ 〃 at 16s. = 19 16 0
6 〃 160 stones at $4\frac{3}{4}$d. = 3 3 4
Value of the produce, £104, 7s. $2\frac{1}{2}$d.
Deduct rent of 24 acres, at 25s. = 30 0 0
Expense of time and labour, £74, 7s. $2\frac{1}{2}$d.

7. $4\frac{1}{2}$ qrs. = 144 pecks × 20 = 2880 lb. bread, per acre;
365 × 12 lb. = 4380 lb. per an., for 1 family
5000
2880)21900000 lb. for 5000 families
$7604\frac{1}{6}$ acres for 5000 families
$1\frac{1}{2}$ lb. × 365 = 547·5 lb. per an., for each person
29000000
2880)15877500000
$5513020\frac{5}{6}$ ac. for United Kingdom.

8. $31\frac{17}{28}$ qr. ÷ $50\frac{4}{7}$ qr. = $\frac{885}{28} \times \frac{7}{354} = \frac{5}{8}$ = ·625;
$71\frac{9}{40}$ fur. ÷ $325\frac{3}{5}$ fu. = $\frac{2849}{40} \times \frac{5}{1628} = \frac{7}{32}$ = ·21875

9. 216 yards linen, at 3s. 7d. = £38, 14s. 0d.
78 〃 cotton, 1 3 = 4 17 6
120 〃 corduroy, 2 7 = 15 10 0
185 〃 velvet, 3 2 = 29 5 10
Value of the goods, £88, 7s. 4d.
Interest, $\frac{1}{20}$ = 4 8 $4\frac{1}{4}$ $\frac{3}{5}$
Due at the year's end, £92, 15s. $8\frac{1}{4}$d. $\frac{3}{5}$

10. B. P. of the whole, . £412, 10s. 0d.
Gain, . . . 17 16 8
S. P. of the whole, . 430 6 8
85 yd. at 15s. = 63 15 0
S. P. of remainder, . £366, 11s. 8d.

£63, 15s. 0d. S. P. of 85 yards
6 7 6 loss on 85 yards, then
£70, 2s. 6d. : £412, 10s. : : 85 yds. : 500 yards;

Hence, 500 yds. — 85 yds. = 415 yds. remained, and £366, 11s. 8d. ÷ 415 = 17s. 8d. S. P. of rem. per yd.

11. £48·75 + £72·5 + £84·$\dot{6}$ = £205·91$\dot{6}$; hence,
£205·91$\dot{6}$: £48·75 :: £100 : £23, 13s. 5$\frac{3}{4}$d. $\frac{1583}{2471}$, share of 1st
205·91$\dot{6}$: 72·5 :: 100 : 35 4 2$\frac{0}{4}$ $\frac{200}{2471}$ 〃 2d
205·91$\dot{6}$: 84·$\dot{6}$ :: 100 : 41 2 4$\frac{0}{4}$ $\frac{688}{2471}$ 〃 3d
Amt. of effects, £100, 0s. 0d.

12. 215 : 125 :: 5$\frac{1}{2}$s. : 3s. 2$\frac{1}{4}$d. $\frac{21}{43}$, per lb. of tea

13. 13$\frac{3}{16}$ cwt. hops at 35s. = £23, 1s. 6$\frac{3}{4}$d.
10 sov. = £10, 0s. 0d.
8 fl. = 0 16 0
7 h. gu. = 3 13 6
14 9 6
Val. of brandy, = £8, 12s. 0$\frac{3}{4}$d.
Hence, 11s. 6d. : £8, 12s. 0$\frac{3}{4}$d. :: 1 gal. : 14$\frac{177}{184}$ gal.

14. £102$\frac{1}{2}$: £100 :: £400 : £390, 4s. 10$\frac{1}{2}$d. $\frac{6}{41}$, S. P.; hence,
£390, 4s. 10$\frac{1}{2}$d. $\frac{6}{41}$ — £360 = £30, 4s. 10$\frac{1}{2}$d. $\frac{6}{41}$ gain.

15. 400 yards cloth, at 10s. = £200, 0s.
64 st. wool, at 14s. = £44, 16s.
Cash, 80 0
124 16
Val. of cotton, = £75, 4s.
Hence, 9d. : £75, 4s. :: 1 lb. : 2005$\frac{1}{3}$ lb. of cotton.

16. 3 cwt. 3 qr. 15 lb. = 6960 oz., at 6d. = £174;
and 3480s. ÷ 400 = 8·7s. ≐ 8s. 8$\frac{1}{4}$d. $\frac{3}{5}$, per gal.

17. 5$\frac{1}{2}$s. : 7s. :: 6$\frac{1}{4}$s. : 7s. 11$\frac{5}{11}$d., whence A has the advantage by $\frac{6}{11}$d. per gal. of rum.

18. 336 lb., at 7s. 4d. = 2464s.; hence, 2464s. ÷ 2$\frac{1}{2}$s. = 985$\frac{3}{5}$ yd. given by D, then,
7s. : 2$\frac{1}{3}$s. :: 7$\frac{1}{3}$s : 2$\frac{4}{9}$s., and 2$\frac{1}{2}$s. — 2$\frac{4}{9}$s. = $\frac{1}{18}$s. = $\frac{2}{3}$d. advantage in favour of D.

19. 55 doz. wine, at 39s. = £107, 5s. 0d.
Int. on it for 2$\frac{1}{2}$ years, 13 8 1$\frac{1}{2}$
Expenses of keeping it, 0 17 0
£121, 10s. 1$\frac{1}{2}$d.
52$\frac{5}{6}$ doz., at 46s. 6d. = 122 16 9
Gain by keeping it, £1, 6s. 7$\frac{1}{2}$

20. 5$\frac{3}{4}$s. : 7$\frac{1}{6}$s. :: 6$\frac{1}{4}$s. : 7s. 9$\frac{11}{23}$d., value of B's cloth

21. 102 lb. tea, at 4s. 9d. = £24, 4s. 6d.
36 do. 3s. 6d. = 6 6 0
54 do. 7s. 4d. = 19 16 0
Value given in barter, £50, 6s. 6d.

546 lb. sugar, at £3, 8s. per cwt. = £16, 11s. 6d.
735 do. £4, 16s. " = 31 10 0
Received in money, 2 5 0
£50, 6s. 6d.

22. 81 yards, at 17s. 3d. = £69, 17s. 3d.
155 do. 11s. 7d. = 89 15 5
£159, 12s. 8d.
Deduct 5 per cent., 7 19 $7\frac{1}{2}$ $\frac{2}{5}$
Value received, £151, 13s. $0\frac{1}{4}$d. $\frac{3}{5}$

23. £7 ÷ 112 = 15d. per lb. of tobacco, and
$56\frac{1}{2}$ lb. of tea, at 11s. 5d. = 7740·5d.; then,
15d. : 7740·5d. :: 1 lb. : $516\frac{1}{30}$ lb. of tobacco.

24. 17 cwt. 3 qr. 23 lb., at £6, 18s. = £123, 17s. $10\frac{1}{14}$d.
5 0 19 at 62s. = 16 0 $6\frac{3}{14}$
Value received, £139, 18s. $4\frac{2}{7}$d.
120 gallons brandy, at 1s. 2d. = 7 0 0
252 gallons rum,
372 gallons at the rum price, = £132, 18s. $4\frac{2}{7}$d.

Hence, £132, 18s. $4\frac{2}{7}$d. ÷ 372 = 7s. $1\frac{3}{4}$d.$\frac{3}{868}$, per gallon of rum, and 7s. $1\frac{3}{4}$d.$\frac{3}{868}$ + 1s. 2d. = 8s. $3\frac{3}{4}$d.$\frac{3}{868}$, per gallon of brandy.

25. 750 qrs. wheat, at 39s. 6d. = £1481, 5s.
Received in money, 760 10
Value of 540 qr. of barley, £720, 15s.

Hence, £720, 15s. 0d. ÷ 540 = £1, 6s. $8\frac{1}{4}$d. $\frac{1}{3}$ per qr.

26. Cost of 30 oxen for 1 ye., at £3, 5s. = £97, 10s. 0d.
30 oxen for 6 months, = £48, 15s. 0d.
6 " for 3 months, = 4 17 6
53 12 6
Remainder, £43, 17s. 6d.

Now, £48, 15s. × 45 ÷ 30 = £73, 2s. 6d., cost of 45 ox. for 6 mo., and £73, 2s. 6d. ÷ 6 = £12, 3s. 9d., cost of 45 ox. for 1 mo.; hence, £12, 3s. 9d. : £43, 17s. 6d. : : 1 mo. : 3⅗ mo., during which the 45 ox. may be continued after the half-year.

Again,	45 oxen for 6 months =	£73,	2s.	6d.
	30 〃 6 months =	48	15	0
	6 〃 3 months =	4	17	6
	Price, for 1 year,	£126,	15s.	0d.

27.

20160 lb. beef, at 3¾d. =				£315,	0s.	0d.
3150 lb. tallow, at 6½d. =				85	6	3
45 hides, at 1 guinea, =				47	5	0
Amount of the sale,				£447,	11s.	3d.
30 oxen, at £4, 5s. =	£127,	10s.	0d.			
6 〃 at 5 18 =	35	8	0			
9 〃 at 6 14 =	60	6	0			
Grazing, per last quest. =	97	10	0			
810 pecks corn, at 6⅛d. =	20	13	5¼			
1080 trusses hay, at 14d. =	63	0	0	404	7	5¼
Gain,				£43,	3s.	9¾d.

28.

35 bar. beef, at 35s. 6d. =	£62,	2s.	6d.
16 bar. pork, at 52s. =	41	12	0
175½ cwt. bread, at 25s. =	219	7	6
82 bush. pease, at 5s. =	20	10	0
26$\frac{11}{16}$ cwt. cheese, at 30s. =	40	0	7½
18$\frac{25}{28}$ cwt. butter, at 74⅔s. =	70	10	8
26½ qrs. oatmeal, at 19s. =	25	3	6
8 cwt. fish, at 26s. =	10	8	0
Small charges, =	1	7	3½
Profit, =	185	5	5
Amount of his account,	£676	7	6

160 privates, at 15s. =	£120,	0s.
8 officers, 〃 45s. =	18	0
1 captain, =	4	10
Receipt, per month,	£142,	10s.; hence,

£142½ : £676⅜ : : 1 mo. : 4 mo. 20$\frac{257}{285}$ da.

29. 1180 × 120 = 141600 cub. inches in 120 jars.
$7\frac{1}{2}$
1062000 lb. gross.
$\frac{1}{16}$ = 66375 tare.
995625 lb. net.
231 × 112 63
25872) 62724375d.
$2424\frac{1}{4}$d.
£10, 2s. $0\frac{1}{4}$d. $\frac{199}{308}$ the freight.

30. The captain has 9 shares.
1st mate, etc., $6\frac{1}{3}$ × 3 = 19
2d mate, 5 3)£31235, 8s.
52 sailors, each $1\frac{1}{4}$ = 65 £10411, 16s. crew's sh.
42 marines, each $\frac{6}{7}$ = 36
In all, 134shs.)£10411, 16s.
£77, 14s. one share.

£77, 14s. × 9 = £699, 6s. 0d. captain's share.
77 14 × $6\frac{1}{3}$ = 492 2 0 1st mate, surg. & carpt.
77 14 × 5 = 388 10 0 2d mate's share
77 14 × $1\frac{1}{4}$ = 97 2 6 each sailor's share
77 14 × $\frac{6}{7}$ = 66 12 0 each marine's share

31. £24642 val. at £1
10s. = £$\frac{1}{2}$ = £12321, 0s. val. at 10s.
1s. 8d. = $\frac{1}{6}$ of 10s. = 2053 10 " " 1s. 8d.
£14374, 10s. " " 11s. 8d.

32. Since $\frac{77}{60}$ of the estate, diminished by £340, is equal to the estate, then £340 = $\frac{17}{60}$ of the estate, and 17 : 60 :: £340 : £1200 the estate; hence the share of the eldest son is . £600 — £140 = £460
Of the second, . . 300 + 20 = 320
Of the third, . . 400 — 220 = 180
Of the wife, . . $\frac{1}{5}$ of £1200 = 240
The estate as before, £1200

33. £1850 ÷ 48 = £38·541$\dot{6}$ claim per £1; hence,

$$£38{\cdot}541\dot{6}\times\begin{cases}3 = £115{\cdot}625 = £115,\ 12\text{s. } 6\text{d.} = \text{1st}\\ 5 = 192{\cdot}708\dot{3} = 192\ \ 14\ \ 2 = \text{2d}\\ 7 = 269{\cdot}791\dot{6} = 269\ \ 15\ \ 10 = \text{3d}\\ 9 = 346{\cdot}875 = 346\ \ 17\ \ 6 = \text{4th}\\ 11 = 423{\cdot}958\dot{3} = 423\ \ 19\ \ 2 = \text{5th}\\ 13 = 501{\cdot}041\dot{6} = 501\ \ 0\ \ 10 = \text{6th}\end{cases}$$

£1850, 0s. 0d.

34. $\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}=\frac{30}{60}+\frac{20}{60}+\frac{15}{60}+\frac{12}{60}=\frac{77}{60}$; that is, of 77 shares, A claims 30, B 20, C 15, and D 12.

Now, 21s. ÷ 77 = $\frac{3}{11}$s. share for 1; hence,

$\frac{3}{11}$s. × 30 = 8s. 2$\frac{2}{11}$d. A's share.
$\frac{3}{11}$s. × 20 = 5 5$\frac{5}{11}$ B's share.
$\frac{3}{11}$s. × 15 = 4 1$\frac{1}{11}$ C's share.
$\frac{3}{11}$s. × 12 = 3 3$\frac{3}{11}$ D's share.
21s. 0d.

35. £550 × 8 = £4400 = the product of G's stock and time; now this is half the sum of the products of all their stocks by their times, which is therefore £8800.

Then, 5)£8800
4) 1760 = the prod. of E's stock and time.
£440 = E's stock.

And, £4400
1760
9) 2640 = prod. of F's stock and time.
£293, 6s. 8d. = F's stock.

36. The wolf by herself eats . $\frac{1}{6}$ of the sheep.
The wolf and tiger eat $\frac{1}{2}+\frac{1}{6}=\frac{4}{6}$ 〃
Devoured before the lion came, $\frac{5}{6}$ 〃
To be devoured by the three, $\frac{1}{6}$ 〃

Now the three would devour 6 sheep in 1 hour, whence 6 : $\frac{1}{6}$: : 60 min. : 1$\frac{2}{3}$ minutes, in which the three devour the remainder, so that they take 21$\frac{2}{3}$ min. altogether

37. 40 days at 3s. 6d. = £7, 0s. 0d.
5 6 9
Forfeit per day, 1 3 £1, 13s. 3d.
4s. 9d. 33s.
57d.)399d.
Idle, 7 days

38. $14\frac{1}{8} - \frac{7}{11}$ of $\frac{33}{5} + \frac{5}{23}$ of $\frac{69}{11} = \frac{113}{8} - \frac{21}{5} + \frac{15}{11} =$
$\frac{6215 - 1848 + 600}{440} = \frac{6815 - 1848}{440} = \frac{4967}{440} = 11\frac{127}{440}$

39. 100° : 30° : : (212° — 32°) : 54° and 54° + 32° = 86° F.
= 30° C., also 180° : 9° : : 100° : 5° C. = 41° F.

40. $1 - \frac{35+14+10}{70} = 1 - \frac{59}{70} = \frac{11}{70}$ rem., and £84, 10s. 9½d.
× 70 ÷ 11 = £7, 13s. 8½d. × 70 = £537, 19s. 7d.
the original sum.

41. $1 + \frac{12+6+3+2}{24} = \frac{47}{24}$, hence 47 : 24 : : 1927 : 984,
the number

42. 78 × 39 ÷ 26 = 3 × 39 = 117, the 1st term

43. ⅔d. × 360 = 240d. B. P. of 360 apples
½d. × 240 = 120 B. P. of 240 apples
360d. B. P. of 600 apples
$\frac{7}{10}$d. × 600 = 420 S. P. of do.
5s. = 60d. Gain on do.

44. £807, 5s. 1¾d. ½ — £725, 12s. 6d. = £81, 12s. 7¾d. ½;
hence, £725⅝ : £100 : : £81, 12s. 7¾d. ½
h. ye. 9 : 2 9 1 4¾ ½
5805 800×2 2
18 2 9¾ × 800
5805)14512 10 0
Rate per cent. £2, 10s.

45. 1524600 ÷ 84 = 18150, the number

46. 10 mo. : 6 mo. : : £648, 17s. 6d.
10) £3893, 5s. 0d.
Principal, £389, 6s. 6d

47.

Rent of the fishery, . . .	£360,	0s.	0d.
Wages of 10 men for 249 days, at 10d.	103	15	0
Boats and nets, ...	60	0	0
Price of 166 barrels with salt, at 4s.	33	4	0
	£556,	19s.	0d.
Add $\frac{1}{4}$ of it for tenant's gain, .	139	4	9
The fish was sold for, . . .	£696,	3s.	9d.
Per barrel, £696, 3s. 9d. ÷ 166 =	£4,	3s.	10$\frac{1}{2}$d.$\frac{12}{83}$

Also, 249 days fishing at 250 lb. = 62250 lb., and $\frac{4}{5}$ of 62250 lb. = 49800 lb., the tenant's share; hence, 49800 ÷ 300 = 166 barrels as above.

48. $\frac{3}{7} - \frac{4}{11}$ of $\frac{3}{7} = \frac{33-12}{77} = \frac{21}{77} = \frac{3}{11}$, the 1st rem.; then $\frac{3}{11} - \frac{5}{8}$ of $\frac{9}{15}$ of $\frac{3}{11} = \frac{3}{11} - \frac{9}{88} = \frac{24-9}{88} = \frac{15}{88}$ part left, and £3150 × 15 ÷ 88 = £47250 ÷ 88 = £536, 18s. 7$\frac{7}{11}$d. its value; also, $\frac{12}{77} + \frac{9}{88} = \frac{96+63}{616} = \frac{159}{616}$, the part sold; and its value, £3150 × $\frac{159}{616}$ = £$\frac{450 \times 159}{88}$ = £$\frac{71550}{88}$ = £813, 1s. 4$\frac{4}{11}$d.

49. $\frac{1}{24} + \frac{1}{36} - \frac{1}{30} = \frac{15+10-12}{360} = \frac{13}{360}$ part filled in 1 ho.; hence, $\frac{13}{360}$: 1 :: 1 ho. : $\frac{360}{13}$ h. = 27$\frac{9}{13}$ hours.

50. (4s. 6d. × $\frac{3}{2}$) + (3s. 6d.) + (2s. 6d. × $\frac{1}{4}$) = 6s. 9d. + 3s. 6d. + 7$\frac{1}{2}$d. = 10s. 10$\frac{1}{2}$d., then £30, 9s. ÷ 10s. 10$\frac{1}{2}$d. = 14616 h. d. ÷ 261 h. d. = 56 women, also 56 × $\frac{3}{2}$ = 84 men, and 56 ÷ 4 = 14 boys.

51. $\frac{341}{1} \times \frac{4}{11}$ of $\frac{45}{4} \times \frac{8}{7}$ of $\frac{7}{24}$ = 31 × 5 × 3 = 465, the number.

52. 8s. 1$\frac{1}{2}$d. ÷ 14s. 7$\frac{1}{2}$d. = 195 h. d. ÷ 351 h. d. = $\cdot\dot{5} = \frac{5}{9}$; also, 89 cwt. 3 qr. 23 lb. ÷ 399 cwt. 1 qr. 17 lb. = 10075 lb. ÷ 44733 lb. = $\cdot\dot{2}2\dot{5} = \frac{25}{111}$.

53. $68\frac{4}{7} \div \sqrt[3]{\frac{1728}{2197}} \times \left(\frac{5}{7}\right)^3 = \frac{480}{7} \times \frac{13}{12} \times \frac{125}{343} = \frac{65000}{2401} = 27\frac{173}{2401}$.

54. 42 × 156 ÷ 91 = 6 × 12 = 72, the 2d term.

55. £199, 3s. $0\frac{1}{2}$d. — £181, 13s. 4d. = £17, 9s. $8\frac{1}{2}$d.; hence,
£$181\frac{2}{3}$: £100 : : 1 ye.
£3, 10s. : £17, 9s. $8\frac{1}{2}$d.
545 300
1680 h. d. 8393 h. d.
4 4)11
$2\frac{3}{4}$ years.

56. ($1\frac{3}{4}+2\frac{5}{8}+2\frac{7}{8}$) ml. = $7\frac{1}{4}$ miles of pipe = 12760 yd. = 38280 ft.; and 38280 × 12 lb. = 459360 lb. weight of pipes.

Price of 459360 lb., at $2\frac{3}{4}$d. .	£5263,	10s.	0d.
Laying 12760 yards, at 13d. .	691	3	4
Cisterns and other expenses, .	45	6	8
Total expenses, . . .	£6000,	0s.	0d.

Again, interest on £6000 at 5 p. c. = £300, and £300 ÷ 600 = 10s. paid by each inhabitant.

57.
The first pipe runs 4 gal. × 24 × 60 = 5760 gal. per day;
hence, $4{\cdot}5^2 : 5{\cdot}25^2$: : 5760 gal. : 7840 gal. the 2d runs
$4{\cdot}5^2 : 6{\cdot}75^2$: : 5760 gal. : 12960 gal. run by the 3d.

Also, 5760 gallons run by the 1st
7840 〃 〃 2d
12960 〃 〃 3d
4)26560 gal. run by the three.
6640 number of families.

58. 37 ft. 3 in.
3 8
136 7
2 11
273 2
125 2 5
398 4 5
398 c. ft. 636 c. in.

59. 33 ft. 0 in.
2 10
93 6
1 9
163 $7\frac{1}{2}$ content.
163 c. ft. 1080 c. in.

60.

4)6 ft.	3 in. girt.	
1	$6\frac{3}{4}$	
1	$6\frac{3}{4}$	
1	$6\frac{3}{4}$	
0	$9\frac{3}{8}$	
0	$1\frac{11}{64}$	
2	$5\frac{19}{64}$	area of base.
27	0	
65	$11\frac{1}{64}$	content common way.

65 c. ft. $1586\frac{1}{4}$ c. in.

5)6 ft.	3 in. girt.	
1	3	
1	3	
1	3	
0	$3\frac{3}{4}$	
1	$6\frac{3}{4}$	area of base.
54	0	
84	$4\frac{1}{2}$	true cont.

84 c. ft. 648 c. in.

61.

4)4 ft.	7 in. girt	
1	$1\frac{3}{4}$	
1	$1\frac{3}{4}$	
1	$3\frac{145}{192}$	
31	0	
40	$8\frac{79}{192}$	cont. com. way

40 c. ft. $1211\frac{1}{4}$ c. in.

5)4 ft.	7 in. girt	
0	11	
0	11	
0	$10\frac{1}{12}$	
62	0	
52	$1\frac{1}{6}$	true cont.

52 c. ft. 168 c. in.

62.

5)3 ft.	1 in. girt	
0	$7\frac{2}{5}$	
0	$7\frac{2}{5}$	
0	$4\frac{169}{300}$	
51	0	
19	$4\frac{73}{100}$	true cont.

19 c. ft. $681\frac{9}{25}$ c. in.

By the com. rule, the cont. is 15 c. ft. $262\frac{1}{8}$ c. in.

63.

6 ft.	0 in.	
5	0	
4	6	
12)15	6	
1	$3\frac{1}{2}$	
1	$3\frac{1}{2}$	
1	$8\frac{1}{48}$	
37	0	
61	$8\frac{37}{48}$	cont. com.

61 c. ft. 1263 c. in.

True cont. 79 c. ft. $26\frac{22}{25}$ c. in.

64.

7 ft.	0 in. girt	
6	4	
5	3	
4	8	
3	10	
5)27	1	
4)5	5	mean girt
1	$4\frac{1}{4}$	
1	$4\frac{1}{4}$	
1	$10\frac{1}{192}$	
65	0	
119	$2\frac{65}{192}$	cont. com.

119 c. ft. $336\frac{3}{4}$ c. in.

True cont. 152 c. ft. 984 c. in.

65.

68 ft. 0 in. circuit
11 2 height
9)759 4
84 s. yd. 3 s. ft. 48 s. in., surface

66. From March 8 to April 18 is 41 days; hence,

£384, 15s. 5d.
4×2 = 8
3078 3 4
41
73000)126204 16 8
£1, 14s. $6\frac{3}{4}$d. $\frac{17}{25}$, disct.
384 15 5
£383, 0s. $10\frac{8}{25}$d. net proc.

67. $1-\frac{1}{4}=\frac{3}{4}$, 1st rem.; $\frac{3}{4}-\frac{1}{3}$ of $\frac{3}{4}=\frac{1}{2}$, 2d rem.; $\frac{1}{2}-\frac{1}{5}$ of $\frac{1}{2}=\frac{2}{5}$, 3d rem.; and, $\frac{2}{5}-\frac{1}{6}$ of $\frac{2}{5}=\frac{5}{15}=\frac{1}{3}$, last rem.; hence, 108 gal. × 3 = 324 gal. in all.

68.

37 ft. 0 in. length
25 0 breadth
62 0
2
124 0 circuit
9 8 height
9)1198 8
133 s. yd. 1 s. ft. 96 s. in. surface

69.

74 ft. × $12\frac{1}{2}$ ft. = 925 s. ft. 0 in.
1 door, 6 ft. 9 in. × 1 ft. 5 in. = 9 $6\frac{3}{4}$
1 window, 5 ft. 8 in. × $3\frac{1}{2}$ ft. = 19 10
954 $4\frac{3}{4}$
Deduct, hearth, $6\frac{1}{4}$ ft. × $5\frac{1}{2}$ ft. = 34 $4\frac{1}{2}$
Content, 920 $0\frac{1}{4}$
920 s. ft. 3 s. in.

70. 4,00,08,00,04 (20002 root
4
40002) 80004
80004

$\sqrt{\frac{1573}{1872}} = \sqrt{\frac{121}{144}} = \frac{11}{12}$

71.

£$92\frac{1}{2}$: £$6313\frac{1}{8}$ :: £3
740 50505 × 3
740)151515
1st inc. £204, 15s.
260 8
Yearly gain, £55, 13s.

£$92\frac{1}{2}$: £93 :: £$6313\frac{1}{8}$
£$97\frac{1}{2}$: 4 50505
185 186 21
195 8
5 62 × 21
5)1302
2d inc. £260, 8s.

72. 1 floor, 64 ft. × 34 ft. = 2176 s. ft.
Ded. stair, $12\frac{1}{4}$ ft. × 8 ft. = 98
Cont. of 1 floor, . 2078 s. ft.
5
Cont. of 5 floors, 103·90 s. ft.
2·3
Value of it, . £238·97

73.
38 ft. 0 in. length
23 6 breadth
61 6 × 2
123 0 circuit
11 6
1414 6
$4\frac{2}{3}$ ft. × $3\frac{1}{2}$ ft. = 16 4 chimney
9)1398 2
20d. = £$\frac{1}{12}$)155 s. yd. $3\frac{1}{6}$ s. ft. cont.
£12, 18s. 4d.
3 ft. = $\frac{1}{3}$ yd. = $6\frac{2}{3}$
$\frac{1}{6}$ ft. = $\frac{1}{18}$ of 3 ft. = $\frac{10}{27}$
Value, £12, 18s. $11\frac{1}{27}$d.

74. In 2 days, A has done $\frac{1}{4}$ of the work, and $\frac{3}{4}$ of it remains. Again, $\frac{1}{8}+\frac{1}{12}=\frac{3+2}{24}=\frac{5}{24}$, part done by A and B in 1 day; hence, $\frac{5}{24}:\frac{3}{4}::1$ da. : $\frac{24}{5}\times\frac{3}{4}=\frac{18}{5}$ da. $=3\frac{3}{5}$ days.

75.

8,242,652,826,424,008(202002
8
242652
242408
244826424008
244826424008

4
602×2
4
606002×2

120000
1204
121204×2 =
4
122412000000
1212004
122413212004×2 =

76.
24 ft. 0 in. length
12 9 height
9)306 0
34 yd. of plastering

77.
36 ft. long
15 ft. high
9)540 s. ft.
36)60 yards
$1\frac{2}{3}$ rd. mason work

78. $10\frac{1}{2}$ ft. × $6\frac{1}{3}$ ft. × $1\frac{1}{4}$ ft. × $62\frac{1}{2}$ lb. $=\frac{21}{2}\times\frac{19}{3}\times\frac{5}{4}\times\frac{125}{2}$ lb $=\frac{83125}{16}$ lb. $=5195\frac{5}{16}$ lb. $=2$ to. 6 cwt. 1 qr. $15\frac{5}{16}$ lb.

79. 4840 sq. yd. ÷ 88 yd. = 55 yd. broad.

80.
108 ft. long
$22\frac{1}{2}$ ft. high
9)2430 s. ft.
36)270 sq. yards
$7\frac{1}{2}$ rd. at 32s. = £12

81.
27 ft. long
24 ft. high
$\frac{1}{2}$)648 s. ft. at 3 ft. thick
324
9)972 s. ft. at 2 ft. thick
36)108 s. yards
3 rd. at 30s. = £4, 10s.

82.
56 ft. long
24 ft. high
1344 s. ft., at $2\frac{1}{2}$ brick thick
$\frac{2}{3}$ of 1344 = 896
9)2240 s. ft.
248 s. yd. 8 s. ft. at $1\frac{1}{2}$ brick thick

83. 40d. is 2d. *below* the average 42d., and
48d. is 6d. *above* the average 42d., hence
the two kinds must be mixed in the proportion of 6 lb. at 3s. 4d. to 2 lb. at 4s., or of 3 at 3s. 4d. to 1 at 4s.

84. £1065, 9s. 2d.
± 85 15 10
£1151, 5s. 0d. ÷ 2 = £575, 12s. 6d. A's income
£979, 13s. 4d. ÷ 2 = £489, 16s. 8d. B's "

85. 233d. : 240d. : : £2184⅜
225d. : 240d. 17475 h. cr.
1 16×2×75 75
£2400, original amount

86. 125 ft. long
14⅔ ft. high
1833⅓ s. ft. at 2½ brick thick
⅓ = 611⅑
⅓ = 611⅑
9)3055$\frac{5}{9}$ s. ft.
339 s. yds. 4$\frac{5}{9}$ s. ft., at 1½ brick thick

87. 13 ft. 6 in.
3 8
49 6 hewn work
49 s. ft. 72 s. in.

88. $\sqrt{750^2 \times 2} = \sqrt{1125000} = 1060{\cdot}66$ yd.

89.
$\{(1{\cdot}025)^4 - 1\} \times 336\frac{2}{3} = £{\cdot}10381 \times 336\frac{2}{3} = £34{\cdot}94936$
and £336, 13s. 4d. $\times 4 \times 2\frac{1}{2} \div 100 = £33{\cdot}66666$
Difference, £1, 5s. 7¾d. = £1·28270

90. 12 ft. 4 in.
5 9
70 11
8
567 4 hewn work
567 s. ft. 48 s. in.

N

91. 1760 yd. in a mile
440
1320 yd. in $\frac{3}{4}$ mile long
$22\frac{1}{6}$ yd. = $66\frac{1}{2}$ ft. broad
29260 sq. yd. of paving
$\frac{1}{2}$d. = $\frac{1}{12}$ of 6d. = 2438 2d.
4,0)3169,8 sixp. 2d.
£792, 9s. 2d. the cost

92. 250 qr. $\div 1\frac{1}{4}$ = 250 qrs. $\times \frac{4}{5}$ = 200 qrs. sown

93. $1+\frac{1}{5}+\frac{1}{8}=\frac{40+8+5}{40}=\frac{53}{40}$, hence $53\times\frac{40}{53}=40$ ye. his age

94. 6 ft. 6 in., height of first 3 windows
5 6 〃 next 3 〃
4 9 〃 third 3 〃
16 9 × 3
50 3 whole heights
3 8 common breadth
184 3 content
$184\frac{1}{4}$ s. ft. at $9\frac{3}{4}$d. = £7, 9s. $8\frac{1}{4}$d. $\frac{3}{4}$

95 28 feet
12
8) 336 inches
42 deals will floor the room

96. 24 ft. × $16\frac{1}{2}$ ft. = 396 s. ft., 1st ceiling
$34\frac{1}{2}$ × $21\frac{3}{4}$ = 750·375 2d 〃
40 × 34 = 1360 3d 〃
$98\frac{1}{2}$ $72\frac{1}{4}$ 9)2506·375 s. ft.
$72\frac{1}{4}$ $278\cdot486\dot{1}$ s. yd. ceiling
$170\frac{3}{4}$ × 2
341·5 ft. × $10\frac{1}{2}$ ft. = 3585·75 s. ft.
Doors, $6\frac{1}{2}$ ft. × 9 ft. = 58·5
9)3527·25 s. ft.
Cont. of walls, $391\cdot91\dot{6}$ s. yd.
Hence, $278\cdot486\dot{1}$ s. yd. at 8d. = £9, 5s. $7\frac{3}{4}$d. $\frac{5}{9}$
$391\cdot91\dot{6}$ 〃 at 3d. = 4 17 $11\frac{3}{4}$
Total value, £14, 3s. $7\frac{1}{2}$d. $\frac{5}{9}$

97.

$$\begin{array}{rr}
15\text{ ft.} & 0\text{ in.}\\
1 & 6\\
\hline
22 & 6\\
12 & \\
\hline
270 &
\end{array}
\qquad
\begin{array}{rr}
60\text{ ft.} & 6\text{ in.}\\
33 & 6\\
\hline
1996 & 6\\
30 & 3\\
\hline
2026 & 9\\
12 & \\
\hline
)24321 & \\
\hline
90\frac{7}{90} & \text{deals}
\end{array}$$

98.

$$\begin{array}{rl}
24 & \text{ft. long}\\
13\frac{1}{2} & \text{ft. broad}\\
\hline
9\,)\,324 & \text{s. ft.}\\
\hline
36 & \text{s. yd.}\\
3 & \\
\hline
108 & \text{c. yd. of digging}
\end{array}$$

99.

$$\begin{array}{rl}
68 & \text{ft. long}\\
33 & \text{ft. broad}\\
\hline
2244 & \text{s. ft.}\\
5 & \text{ft. deep}\\
\hline
27\,)\,11220 & \text{c. ft.}\\
\hline
415\frac{5}{9} & \text{c. yd. at 1s. 3d.} = \text{£25, 19s. } 5\frac{1}{3}\text{d.}
\end{array}$$

100. 13s. 4d.—12s. = 1s. 4d. = £$\frac{1}{15}$; hence, £316, 14s. 2d. × 15 = £4750, 12s. 6d. amount of his debts.

101. £$61\frac{2}{3}$ ÷ 84 = $176\frac{4}{21}$d. average price per yd.
now, 13s. 4d. is $16\frac{4}{21}$d. *below* the average
and, 16s. 8d. is $23\frac{17}{21}$d. *above* the average
hence, $23\frac{17}{21}$ at 13s. 4d. + $16\frac{4}{21}$d. at 16s. 8d. = 40 at $176\frac{4}{21}$d.;
but 40 should be 84, therefore
40 : $23\frac{17}{21}$: : 84 yd. : 50 yd. at 13s. 4d.
40 : $16\frac{4}{21}$: : 84 yd. : 34 〃 〃 16s. 8d.

102. 2500 × (24—16) = 20000 rations for 5 days; hence, 20000 ÷ 5 = 4000 the whole number of men, and 4000—2500 = 1500 men in the reinforcement.

103. £11, 3s. 6d. ÷ 90 = 29⅘d. the average; now, 2s. is 5⅘d. *below* the average, and 2s. 6d. is ⅕d. *above* the average; hence, ⅕ at 2s. + 5⅘ at 2s. 6d. = 6 at 29⅘d.; but 6 ought to be 90, therefore, 6 : 5⅘ :: 90 : 87 half-crowns, and 6 : ⅕ :: 90 : 3 florins.

104. The first troop has gone 10½ ml. before the 2d starts; hence the 2d must travel 10½ × 4 × 2 = 84 ml. to overtake the 1st, which it will, in 84 ÷ 4 = 21 ho. 0 m.
while the 3d will do so, in 84 ÷ 4½ = 18 〃 40 〃
The 3d should start after the 2d, 2 ho. 20 m.

105. 2640 gal. ÷ 40 = 66 gals. per minute
Excess of 1st and 2d over 3d = 6 〃 〃
3)60
3d conveys . . 20 gals. per minute
2d 〃 20 + 15 = 35 〃 〃
1st 〃 20 − 9 = 11 〃 〃
The three convey . 66 gals. per minute

106. $\frac{1}{4} - \frac{1}{6} = \frac{3-2}{12} = \frac{1}{12}$ = part done by B in 1 day; B therefore takes 12 days to do the whole, and 12 ÷ 2 = 6 days to do the half, while A takes 6 ÷ 2 = 3 days; B must therefore begin 3 days before A, so that each may do one-half of the work.

107. 62½ lb. wt. of 1 c. ft. of water
13½
843¾ lb. wt. of 1 c. ft. of mercury
2½
2109⅜ lb. wt. of the atmosphere on 1 sq. ft.
15
31640⅝ lb. wt. on a man's body

198943750 sq. ml. in the earth's surface
27878400 s. ft. in a mile
5546233440000000 s. ft. in the earth's surface
2109⅜ lb. wt. on 1 s. ft.
11699086162500000000 lb. wt. on the earth, or the wt. of the whole atmosphere

108. 31 : 21 :: 5546233440000000 s. ft. in earth's [surface

31) 116470902240000000

Surface of sea, $3757125878709677\frac{13}{31}$ s. ft.

10560 ft. deep

Cont. of sea, $39675249279174193548\frac{12}{31}$ c. ft.

$62\frac{1}{2}$ lb.

Fresh-water, $2479703079948387096774\frac{6}{31}$ lb.

·03

Salt in it, $74391092398451612903\frac{7}{31}$ lb.

Salt-water, $2554094172346838709677\frac{13}{31}$ lb.

109. 20 s. sterling

$77\frac{3}{4}$ s. ster. = 480 grs. standard

12 grs. stand. = 11 grs. fine

$232\frac{1}{5}$ grs. fine = 10 dollars

361071) 1760000

4·8743 dol. per £1 ster.

also, 4·8743 dol. × 100 ÷ $4\frac{4}{9}$ = $109\frac{2}{3}$ per £100 ster., or $9\frac{2}{3}$ per cent. premium nearly.

110. 240d. sterling

60d. ster. = 1 oz. standard

40 oz. stand. = 37 oz. fine

1 oz. fine = 31·1002 wigties

1000 wigties = $104\frac{1}{2}$ fl.

100000) 1202489·233

12·02 fl. per £1 ster.

111. $w = 5\times100\times\frac{1}{10} = 50$; $d = 5\times100\times\frac{1}{50} = 10$;
$D = 50\times10\times\frac{1}{5} = 100$; $p = 50\times10\times\frac{1}{100} = 5$

112. $w = 5\times110\times\frac{1}{10} = 55$; $d = 5\times110\times\frac{1}{55} = 10$;
$D = 55\times10\times\frac{1}{5} = 110$; $p = 55\times10\times\frac{1}{110} = 5$

113. $w = 55\times10\times\frac{1}{110} = 5$; $d = 55\times10\times\frac{1}{5} = 110$;
$D = 5\times110\times\frac{1}{55} = 10$; $p = 5\times110\times\frac{1}{10} = 55$

114. 4 in. × 3 = 12 in. from the fulcrum
4 × 4 = 16 " "
4 × 5 = 20 " "
4 × 6 = 24, etc. "

115. A gallon = 277·274 cub. in. = 0·16045949 c. ft.
63
C. ft. in 63 gal. . = 10·1089479
$62\frac{1}{2}$ lb.
Weight of 63 gal. . 6)631·8092437 lb.
Force for raising 63 gal., 105·30154 lb.

116. $16\frac{1}{12}$ ft.
81 = 9 × 9 sec.
$1302\frac{3}{4}$ ft. in 9 sec.

117. $16\frac{1}{12}$) 600 ft. high
37·3057 (6·108— sec.
121) 130
12208) 95700

118. $1^2 : 20^2 :: 16\frac{1}{12}$ ft. : $6433\frac{1}{3}$ feet

119. 60 × 7 ÷ 70 = 6 sec., and $1^2 : 6^2 :: 16\frac{1}{12}$ ft. : 579 ft.

120. 1142 ft. × 30 = 34260 ft. = $6\frac{43}{88}$ miles

121. 1 mile = 5280 ft., and 5280 × 7 ÷ 1142 = 36960 ÷ 1142 = $32\frac{208}{571}$ sec.

122. Suppose the sun's light, etc., at Uranus to be 1°; then
$95^2 : 1823^2 :: 1°$
9025) 3323329
$368\frac{2129}{9025}$, light, etc., at the Earth;
$37^2 : 1823^2 :: 1°$
1369) 3323329
$2427\frac{766}{1369}$, light, etc., at Mercury;
$69^2 : 1823^2 :: 1°$
4761) 3323329
$698\frac{141}{4761}$, light, etc., at Venus;

$$145^2 : 1823^2 :: 1^\circ$$

$$21025\,)\,\overline{3323329}$$

$158\frac{1379}{21025}$, light, etc., at Mars;

$$495^2 : 1823^2 :: 1^\circ$$

$$245025\,)\,\overline{3323329}$$

$13\frac{138004}{245025}$, light, etc., at Jupiter;

$$907^2 : 1823^2 :: 1^\circ$$

$$822649\,)\,\overline{3323329}$$

$4\frac{32733}{822649}$, light, etc., at Saturn.

Suppose the sun's light, etc., at the earth to be 1°; then at Mercury it is $95^2 \div 37^2 = 6\frac{811}{1369}$; at Venus it is $95^2 \div 69^2 = 1\frac{4264}{4761}$; at Mars it is $95^2 \div 145^2 = 19^2 \div 29^2 = \frac{361}{841}$; at Jupiter it is $95^2 \div 495^2 = 19^2 \div 99^2 = \frac{361}{9801}$; at Saturn $95^2 \div 907^2 = \frac{9025}{822649}$; and at Uranus it is $\frac{9025}{3323329}$.

DECIMAL COINAGE.

1.	£79·200	4.	£96·600	7.	£136·520	10.	£135·802
2.	97·500	5.	110·780	8.	163·400	11.	315·040
3.	69·800	6.	101·090	9.	153·986	12.	513·007

13.	£84,	2 fl.	0 c.	0 m.	19.	£213,	3 fl.	0 c.	5 m.
14.	48	3	4	0	20.	312	0	4	8
15.	96	2	5	7	21.	572	8	6	7
16.	108	0	2	5	22.	257	4	8	0
17.	123	0	0	7	23.	752	0	2	5
18.	132	1	7	4	24.	572	0	0	9

25.	£45·325	26.	£148·058	27.	£784·204
	54·602		418·507		874·057
	37·050		184·987		487·928
	73·002		418·006		847·002
	79·560		841·078		748·030
	97·802		481·600		478·508
	111·123		814·582		500·876
	£498·464		£3306·818		£4720·605

28. £956·024
596·370
965·765
695·007
569·206
659·654
729·070
£5171·096

29. £327·325
237·206
273·034
723·008
732·900
372·898
379·206
£3045·577

30. £568·786
586·007
658·050
685·908
856·086
865·456
984·300
£5204·593

31. £836·508
397·679
£438·829

32. £836·657
348·780
£487·877

33. £872·832
384·978
£487·854

34. £482·376
397·709
£84·667

35. £916·030
429·765
£486·265

36. £718·263
419·475
£298·788

37. £28·309
9
254·781
3
£764·343

38. £37·674
7
263·718
7
£1846·026

39. £73·850
8
590·800
9
£5317·200

40. £84·568
12
1014·816
8
£8118·528

41. £67·079
11
737·869
9
£6640·821

42. £84·263
110
£9268·930

43. £95·108
9
855·972
7
£5991·804

44. £59·687
12
716·244
12
£8594·928

45. £7·896
19
71064
7896
£150·024

46. £9·708
23
29124
19416
£223·284

47. £12·073
47
84511
48292
£567·431

48. £15·007
95
75035
135063
£1425·665

49. £24·375
101
24375
243750
£2461·875

50. £37·086
243
111258
148344
74172
£9011·898

51. £48·904
313
146712
48904
146712
£15306·952

52. £73·627
379
662643
515389
220881
£27904·633

53.

$$24\left\{\begin{array}{r} 4\,)\,\underline{\pounds 209{\cdot}376} \\ 6\,)\,\underline{52{\cdot}344} \\ \pounds 8{\cdot}724 \end{array}\right.$$

54.

$$27\left\{\begin{array}{r} 3\,)\,\underline{\pounds 266{\cdot}625} \\ 9\,)\,\underline{88{\cdot}875} \\ \pounds 9{\cdot}875 \end{array}\right.$$

55.

$$35\left\{\begin{array}{r} 5\,)\,\underline{\pounds 401{\cdot}555} \\ 7\,)\,\underline{80{\cdot}311} \\ \pounds 11{\cdot}473 \end{array}\right.$$

56.

$$44\left\{\begin{array}{r} 4\,)\,\underline{\pounds 562{\cdot}408} \\ 11\,)\,\underline{140{\cdot}602} \\ \pounds 12{\cdot}782 \end{array}\right.$$

57.

$$56\left\{\begin{array}{r} 7\,)\,\underline{\pounds 777{\cdot}896} \\ 8\,)\,\underline{111{\cdot}128} \\ \pounds 13{\cdot}891 \end{array}\right.$$

58.

$$63\left\{\begin{array}{r} 7\,)\,\underline{\pounds 995{\cdot}211} \\ 9\,)\,\underline{142{\cdot}173} \\ \pounds 15{\cdot}797 \end{array}\right.$$

59.

$$81\left\{\begin{array}{r} 9\,)\,\underline{\pounds 1165{\cdot}995} \\ 9\,)\,\underline{129{\cdot}555} \\ \pounds 14{\cdot}395 \end{array}\right.$$

60.

$$132\left\{\begin{array}{r} 11\,)\,\underline{\pounds 1041{\cdot}876} \\ 12\,)\,\underline{94{\cdot}716} \\ \pounds 7{\cdot}893 \end{array}\right.$$

61.

$$\begin{array}{l} 19)\pounds 338{\cdot}656(\pounds 17{\cdot}824 \\ \quad\quad 148 \\ \quad\quad\; 156 \\ \quad\quad\quad 45 \\ \quad\quad\quad\; 76 \end{array}$$

62.

$$\begin{array}{l} 26)\pounds 566{\cdot}852(\pounds 21{\cdot}802 \\ \quad\quad\; 46 \\ \quad\quad 208 \\ \quad\quad\quad\; 52 \end{array}$$

63.

$$\begin{array}{l} 37)\pounds 1010{\cdot}729(\pounds 27{\cdot}317 \\ \quad\quad 270 \\ \quad\quad\; 117 \\ \quad\quad\quad 62 \\ \quad\quad\quad 259 \end{array}$$

64.

$$\begin{array}{l} 46)\pounds 734{\cdot}298(\pounds 15{\cdot}963 \\ \quad\quad 274 \\ \quad\quad\; 442 \\ \quad\quad\quad 289 \\ \quad\quad\quad\; 138 \end{array}$$

65.

$$\begin{array}{l} 89)\pounds 1596{\cdot}838(\pounds 17{\cdot}942 \\ \quad\quad\; 706 \\ \quad\quad\quad 838 \\ \quad\quad\quad\; 373 \\ \quad\quad\quad\quad 178 \end{array}$$

66.

$$\begin{array}{l} 98)\pounds 1482{\cdot}054(\pounds 15{\cdot}123 \\ \quad\quad\; 502 \\ \quad\quad\quad 120 \\ \quad\quad\quad\; 225 \\ \quad\quad\quad\; 294 \end{array}$$

67.

$$\begin{array}{l} 123)\pounds 1214{\cdot}379(\pounds 9{\cdot}873 \\ \quad\quad\quad 1073 \\ \quad\quad\quad\; 897 \\ \quad\quad\quad\quad 369 \end{array}$$

68.

$$\begin{array}{l} 292)\pounds 3785{\cdot}780(\pounds 12{\cdot}965 \\ \quad\quad\quad 865 \\ \quad\quad\quad 2817 \\ \quad\quad\quad\; 1898 \\ \quad\quad\quad\quad 1460 \end{array}$$

69. £·425
70. ·6125
71. ·666$\dot{6}$
72. ·7875

73. £·875
74. ·916$\dot{6}$
75. 4·125
76. 7·1875
77. 9·833$\dot{3}$

78. £10·775
79. 14·8125
80. 19·883$\dot{3}$
81. 29·28125
82. 47·333$\dot{3}$

83. £59·42083
84. 79·8125
85. 85·775
86. 98·083$\dot{3}$

87. 12s. 6d.
88. 15 6
89. 17 1
90. 7 6
91. 19 8
92. 10 4

93. £4, 11s. 8d.
94. 7 13 4
95. 9 16 8
96. 12 6 8
97. 14 18 8½
98. 17 13 8

99. £29, 19s. 1d.
100. 47 14 3¾
101. 58 11 7¾
102. 77 6 6¾
103. 84 9 8
104. 99 0 8

PRACTICAL EXERCISES.

1.
£525·875
375·986
Saves, £149·889

2.
£·037
37
259
111
Cost, £1·369

3.
67)£82·075(£1·225
150
167
335

4.
52)£92·300(£1·775
403
390
260

5.
£2·375
57
16625
11875
£135·375

6.
89)£505·075(£5·675
600
667
445

7.
£·275)£34·375(125 oz.
687
1375

8.
17 cwt. : 183 cwt. : : £36·125
183 × 2·125
£388·875

9.
£·225 : £·1875 : : 243 yd.
·025 7·5 × 27
$202\frac{1}{2}$ yd.

10.
578 lb. : 112 lb. : : £13·005
289 56 × ·045
£2·520 per cwt.

11. £3·5 : £2·8 : : £·0375
5 4 × ·0075
£·030

12. £·625 : £5756 : : £1
£9209·600

13.
125·156 : £187·734 : : 45 m.
da. 15 : 10
125·156 × 3 : 187·734 × 2
375·468 375·468
45 men

14. £525·375 : £100 : : 1 ye.
£5 : £87·5625
6 6)20
$3\frac{1}{3}$ ye.

15. men, 24 : 56 : : £6
da. 15 : 25 1
m. 32 : 24
1 7
1 5
2 1
2) 35
£17·500

16. £13·797 ÷ £23·652 = $\frac{7}{12}$

17.
£7·616 ÷ £14·875 = ·512

18. £19·600
12
2 qr. = $\frac{1}{2}$ cwt. 235·200
1 〃 = $\frac{1}{2}$ of 2 qr. 9·800
14 lb. = $\frac{1}{2}$ qr. 4·900
2·450
£252·350

19. £574·600 × 4·5
2585·700 × 3·5
100)9049·95
£90·4995

20. £5760·800
$2\frac{1}{3} \times 2\frac{1}{4}$ = 5·25
100)30244·200
Int. £302·442
Prin. 5760·800
Amt. £6063·242

21. £1533
$240 \times 6\frac{1}{2}$ = 1560
73000) 2391480
Int. £32·760

22. £520·125
2 ye. 120 da. = 850
442106·250 × 8
73000)3536850·000
Int. £48·450
Prin. 520·125
Amt. £568·575

23. £4 × $2\frac{1}{4}$ = £9 int. on £100; hence,
£109 : £100 :: £188·025
109) 18802·500
£172·500

24. £2·5 × $\frac{1}{2}$ = £1·25 int. on £100; hence,
£101·25 : £1·25 :: £763·344
81
£9·424 disct.

25. £2·5 × $\frac{219}{365}$ = £1·5 int. on £100; hence,
£101·5 : £100 :: £187·775
101·5) 18777·500
Pres. val. £185

26. £1024·155 — £775·875 = £248·280 int.
£775·875 : £100 :: £248·280
ye. 8 : 1
6207·000 100 × 248·280
6207) 24828
4 per cent.

27. £3·5 : £100·8 :: 365 da.
£2053·125 : 100
7185·9375 10080 × 365
7185·9375) 3679200
512 days

28. £70·50
£·175
35250
49350
7050
£12·33750

29.
£100 : £948·512 :: £92·625
100)87855·924
£878·55924

30. £3 : £245·256 :: £92·25
1 30·75 30·75
£7541·622

31. £100 : £5000 :: £3 :: £150
also, £399·9 — £150 = £249·9; hence,
£3·5 : £249·9 :: £93·25
·7 357 × 18·65
£6658·050

32. £·225 × 12 = £2·700
·200 × 15 = 3·000
·175 × 20 = 3·500
·150 × 24 = 3·600
Gain, ·832
71)13·632
Per lb., £·192

33.
£1774·944 ÷ 2311·125 = ·768
£420·625 × ·768 = £323·0400
342·375 × ·768 = 262·9440
497·325 × ·768 = 381·9456
508·675 × ·768 = 390·6614
542·125 × ·768 = 416·3520
2311·125 × ·768 = 1774·9440

34. B has 1 share, A $1\frac{1}{3}$ sh., C $\frac{2}{3}$ sh., and D $\frac{3}{5}$ of $\frac{2}{3} = \frac{2}{5}$ sh.; hence, $1 + \frac{4}{3} + \frac{2}{3} + \frac{2}{5} = \frac{15+20+10+6}{15} = \frac{51}{15}$, and

51 : 15 :: £1383·936 : £407·040 B.
51 : 20 :: 1383·936 : 542·720 A.
51 : 10 :: 1383·936 : 271·360 C.
51 : 6 :: 1383·936 : 162·816 D.
Proof, £1383·936

35. 2 + 3 + 4 + 5 = 14, sum of propor.; hence,

14 : 2 : £474·292 : £67·756
14 : 3 : 474·292 : 101·634
14 : 4 : 474·292 : 135·512
14 : 5 : 474·292 : 169·390
Proof, £474·292

36. £·025 × 112 = £2·800 B. P. per cwt.
·600
3·400 S. P. 〃
3
10·200 〃 of 3 cwt.
2 qr. = $\frac{1}{2}$ cwt. 1·700 〃 2 qr.
14 lb. = $\frac{1}{4}$ of 2 qr. ·425 〃 14 lb.
3 × 12·325 〃 3 c. 2 q. 14 lb.
£36·975 〃 3 casks

37. £100 : £107$\frac{1}{2}$ :: £613·256
S. P. £659·2502

38. £525 × (1 — ·075) = £525 × ·925 = £485·625

39. By Table I., p. 172, com. int. of £1 for 4 ye.
at 4 p. c. . . = £·16986
S. I. of £1 for 4 ye. at 4 p. c. ·16000
Diff. ·00986
450·675
Diff. required, £4·443

40. By Table II., p. 173,
P. V. of £1 for 3 ye.,
at 3 p. c. = £·915142
756·805
P. V. required, £692·584

41. By Table III., p. 174,
amt. of £1 an. for 5 ye.
at 4 p. c. = £5·4163
45
Amt. required, £243·7335

42. 1 × ·1 + ·01 + ·001 =
£1·111)£809·919
729 of each

43. £1005·489
45·759
2)1051·248 sum
£525·624 greater
2)959·730 diff.
£479·865 less

44.
£9·030 : £9·156 :: £107·5
218 × ·5
100 — 109 = 9 p. c.

45.
£1·275 : £2·805 :: 85 yd.
11 × 17
187 yd.

46. 1 — ($\frac{1}{3}$ + $\frac{2}{5}$) = $\frac{4}{15}$ = £97·284 ; hence,
£97·284 × $\frac{15}{4}$ = £364·815

47. $\frac{5}{7}$ — $\frac{1}{4}$ of $\frac{5}{7}$ = $\frac{15}{28}$, 1st rem., also
$\frac{15}{28}$ — $\frac{2}{3}$ of $\frac{15}{28}$ = $\frac{5}{28}$, pt. left ; hence,
$\frac{5}{28}$ of £4576·320 = £817·200

48. $\frac{7}{12}$ — $\frac{5}{12}$ = $\frac{1}{6}$ = £675·524 ; hence,
£675·524 × 6 = £4053·144, the estate

49. £92 : £100 :: £16·675 : £18·125
£18·125 — £16·675 = £1·450 loss, also
£37·700 — £1·450 = £36·250, B. P. of 2d article;
hence, £36·250 : £1·450 :: £100
36·250) 145·000
4 p. c. gain

THE END.

PRINTED BY OLIVER AND BOYD, EDINBURGH.

Educational Works Published by OLIVER and BOYD, Edinburgh; Simpkin, Marshall, and Co., London.

A Medal was awarded by Her Majesty's Commissioners of the International Exhibition of 1862 *to Messrs Oliver and Boyd for their Educational Works, in which are now included the greater part of the Educational Publications of Mr James Gordon, to whom a Medal was also awarded.*

ENGLISH READING, GRAMMAR, ETC.	*s.*	*d.*
Armstrong's English Composition, Part I. 1s. 6d.—Part II........	2	0
Both Parts in one, 3s.—Key to Ditto....................	2	0
.... English Etymology..	2	0
.... English Etymology for Junior Classes......................	0	4
Connon's System of English Grammar..................................	2	6
Cowper's Poems, with Life by M'Diarmid................................	2	0
Dalgleish's English Composition in Prose and Verse, based on Grammatical Synthesis [The *Key*, 2s. 6d.]............................	2	6
Dalgleish's Grammatical Analysis, with Progressive Exercises. *Just published*..	0	9
Key to Ditto..	1	6
Demaus' Selections from Paradise Lost, with Notes..................	1	6
.... Analysis of Sentences, *reduced to*..............................	0	8
Ewing's Principles of Elocution, *improved by Calvert*..................	3	6
Fisher's Assembly's Shorter Catechism Explained.......................	2	0
Fulton's Edition of Johnson's Dictionary................................	1	6
Lennie's Child's A, B, C, Part I. 1½d.—Part II..........................	0	3
.... Child's Ladder..	0	10
.... Principles of English Grammar [The *Key*, 3s. 6d.].........	1	6
Lessons from Dr M'Culloch's First Reading-Book, large type, for hanging on the wall, 10 sheets, 1s.; or mounted on Roller........	1	8
M'Culloch's First Reading-Book...	0	1½
.... Second Reading-Book..	0	3
.... Third Reading-Book..	0	10
.... Fourth Reading-Book and Synopsis of Spelling.......	1	6
.... Series of Lessons in Prose and Verse......................	2	0
.... Course of Reading in Science and Literature............	3	0
.... Manual of English Grammar.................................	1	6
.... Prefixes and Affixes of the English Language.........	0	2
M'Dowall's Rhetorical Readings for Schools............................	2	6
Millen's Initiatory English Grammar......................................	1	0
Milton's Poems, with Life and Notes. Oliver and Boyd's Edition	2	0
Morell's Poetical Reading-Book..	2	6
Rae's First Lessons in English Grammar................................	0	6

HISTORY.

	s.	d.
Corkran's History of England in Epochs, with Maps and Genealogical and Chronological Tables	2	6
Graham's (Dr) Genealogical and Historical Diagrams	4	6
Simpson's History of Scotland, with Map	3	6
.... Goldsmith's History of England, with Map	3	6
.... Goldsmith's History of Rome, with Map	3	6
.... Goldsmith's History of Greece, with Map	3	6
Tytler's Elements of General History, with 2 Maps, Frontispiece, etc	3	6
Watts' Scripture History, with Notice by Dr Tweedie	2	0
White's History of England for Junior Classes	1	6
.... History of Scotland for Junior Classes	1	6
.... History of Scotland for Senior Classes	3	6
.... History of Great Britain and Ireland, with an Account of the Present State and Resources of the United Kingdom and its Colonies. With Map, *reduced to*	3	0
.... History of France, with Map	3	6
.... Sacred History	1	6
.... Outlines of the History of Rome	1	6
.... Outlines of Universal History	2	0
.... Elements of Universal History	7	0
Or in separate Parts:		
1. Ancient History	2	6
2. Middle Ages	2	6
3. Modern History	2	6

MYTHOLOGY.

	s.	d.
Olympus and its Inhabitants: a Narrative Sketch of the Classical Mythology, by Agnes Smith. Edited by John Carmichael, M.A.	3	6

ITALIAN.

	s.	d.
Lemmi's Theoretical and Practical Italian Grammar	5	0
Key to Ditto, *ready*	5	0
Rampini's Italian Grammar *reduced to*	2	6
Key to Ditto	2	0

SCHOOL REGISTERS.

	s.	d.
Myron's School Register of Attendance, Absence, and Fees, arranged on a New and Improved Plan, and adapted to the Revised Code. Each folio serves 50 pupils for a Quarter	1	0
Pupil's Daily Register of Marks. Space for 52 weeks	0	2

LATIN AND GREEK.

	s.	d.
Ainsworth's Latin Dictionary, by Duncan	9	0
Cicero's Orationes Selectae, by Professor Ferguson	1	6
.... Cato Major, Laelius, &c., by Professor Ferguson	1	6
.... De Officiis, by Professor Ferguson	1	6
Clyde's (Dr) Greek Syntax, with Notice by Professor Blackie	4	0
Dymock's Cæsar, with Notes, Index, and Map of Gaul	4	0
.... Sallust, with Notes and Index, *reduced to*	2	0
Edinburgh Academy Class-Books:—		
Rudiments of the Latin Language	2	0
Latin Delectus, with Vocabulary	3	0
Rudiments of the Greek Language	3	6
Greek Extracts, with Vocabulary and Index	3	6
Ciceronis Opera Selecta, published at 4s. 6d., *reduced to*	3	0
Selecta e Poetis Latinis	3	0
Ferguson's (Professor) Grammatical Exercises, with Notes and Vocabulary [The *Key*, 2s.]	2	0
.... Introductory Latin Delectus, with Vocabulary	2	0
.... Ovid's Metamorphoses, with Notes and Index	2	6
Fergusson's (Dr J.) Greek Grammatical Exercises, with Vocabulary, [The *Key*, 3s. 6d.]	3	6
.... Xenophon's Anabasis, Books I. and II., with Vocab.	2	6
Geddes' (Professor) Greek Grammar, for Colleges and Schools	4	0
Greek Testament, Griesbach's Readings, by Duncan, *reduced to*	3	6
Hamilton's Functions of Si and Qui	6	0
.... True Theory of the Subjunctive, *just published*	5	0
Homer's Iliad, by Veitch, from Bekker's Text, and Index, *reduced to*	3	6
.... Books I., VI., XX., and XXIV., with a copious Vocabulary, by J. Fergusson, M.D.	3	6
Hunter's Ruddiman's Latin Rudiments	1	6
.... Sallust, with Notes, *reduced to*	1	6
.... Virgil, with Critical Notes, *reduced to*	2	6
.... Horace, with various Readings, *reduced to*	2	0
.... Livy's History, Books XXI. to XXV., with Notes	4	0
Latin Testament by Beza, revised by Dickinson	3	6
M'Dowall's Cæsar, with Vocabulary, Notes, Map, and Memoir	3	0
.... Virgil, with Vocabulary, Notes, and Memoir	3	0
Macgowan's First Latin Lessons, by Dr Halle, with Vocabulary	2	0
.... Second Latin Lessons, with Vocabulary	3	0
Mair's Introduction to Latin Syntax, by Stewart, with Vocabulary	3	0
Massie's Latin Prose Composition, with Vocab. & Index Verborum	3	6
Melville's Lectiones Selectæ, for Beginners, with Vocabulary	1	6
Neilson's Eutropius and Aurelius Victor, with Vocabulary, etc., *New Edition,* Improved by M'Dowall	2	0
Stewart's Cornelius Nepos, with Notes, Index, and Vocabulary	3	0

OBJECT-LESSON CARDS

ON

THE VEGETABLE KINGDOM.

Set of Twenty in a Box, price £1, 1s.

THE design of this Series is to give a short description of some Plants which are cultivated for their useful properties, *each subject being illustrated with specimens* (attached to the Cards) *of the various objects described*, and forming in this department an interesting Industrial Museum, which will be found of great value in the education of the young.

LIST OF OBJECTS.

PLANTS CULTIVATED FOR THEIR SEED.—1. *Wheat.*—Wheat—Straw-Plait—Biscuit—Paper made of Wheat-Straw—Macaroni. 2. *Coffee.*—Leaf—Seed.

PLANT CULTIVATED FOR ITS ROOT.—3. *Ginger.*—The Root—Leaf of Ginger Plant—Specimen of a Cruciferous Flower and Seed-pod.

PLANTS CULTIVATED FOR THEIR TIMBER.—4. *Scotch Fir and Larch.*—Specimen of Leaves, and Cones. 5. *The Willow Tree*—Osier Twigs—Willow Plait for Bonnets—Material for Bonnet Frames. 6. *Oak.*—Leaf—Oak-bark—Piece of the Trunk—Acorn—Untanned Leather—Tanned Leather. 7. *The Beech Tree.*—Leaf—Beech-nut. 8. *The Ash Tree.*—Leaf and Seed. 9. *The Chestnut.*—Leaf and Nut. 10. *The Birch.*—Leaf—Bark. 11. *The Walnut Tree.*—Leaf and Nut. 12. *The Cypress and Cedar of Lebanon.*—Leaves. 13. *The Sycamore or Plane Tree.*—Leaf.

PLANTS CULTIVATED FOR THEIR FIBRE.—14. *Flax.*—Specimen of Plant before it is sent to the Mill—Fibre of the Stalks—Thread—Linen. 15. *Hemp.*—Fibre of the Stalks—Sail-Cloth—Cord.

PLANTS CULTIVATED FOR THEIR BARK.—16. *The Cork Tree.*—Bark—Bark prepared. 17. *The Papyrus or Bulrush of the Nile.*—Specimen of the Reed, and Filaments of the Crown.

PLANTS CULTIVATED FOR THEIR LEAVES.—18. *The Mulberry.*—Silk-worm's Cocoon—Silk—Satin—Velvet. 19. *The Rose Tree.*—Leaf and Flower.

PLANT USEFUL FOR ITS SALINE PROPERTIES.—20. *Sea-Weed.*—Specimen of Sea-weed.—Soap—Bottle-Glass.

EDINBURGH: OLIVER AND BOYD.
London: SIMPKIN, MARSHALL, AND CO.

DR WHITE'S SCHOOL HISTORIES.

OUTLINES OF THE HISTORY OF ROME,

With Questions for Examination at the end of each Chapter. Edited by Dr White. Small 12mo, 160 pages, price 1s. 6d. bound. 3d Edition.

There is no scarcity of excellent Manuals of Roman History; but nearly all of them are designed for advanced students, while the smaller treatises are generally mere abridgments of works that are now obsolete. It thus appeared that there was need of an introductory volume worthy of an age remarkable for its astonishing progress in the elucidation of the annals of Rome. The present Outlines have accordingly been prepared for the purpose of supplying a want that must often have been felt by teachers. The Author has endeavoured to give a concise but clear and connected view of the leading events, from the earliest times down to the overthrow of the Western Empire in A.D. 476; and it is hoped that, while in many cases this introduction may serve to create a desire for more minute and critical study, it may at the same time furnish those who cannot hope to enjoy such advantages with a correct general survey of Roman history.

OUTLINES OF UNIVERSAL HISTORY,

In Three Parts. Part I. Ancient History; Part II. Middle Ages; Part III. Modern History. Edited by Dr White. 264 pages, price 2s. bound. 6th Edition.

⁂ *This Work is designed as a Text-book for Schools. It contains a general outline of Universal History, and will serve also as an Introduction to Dr White's larger Work.*

Spectator.—"Distinct in its arrangement, skilful in its selection of leading features, close and clear in its narrative."

Christian News.—"There is a fulness in the outline, which is admirably brought out by the condensing powers of the author, and renders the book exceedingly attractive."

Dr WHITE'S ELEMENTS of UNIVERSAL HISTORY,

In Three Parts. Part I. Ancient History; Part II. History of the Middle Ages; Part III. Modern History. Complete in One Volume 12mo, with a Map of the World. **Reduced to 7s.** bound. 9th Edition.

The Three Parts, each complete in itself, may also be had separately, 2s. 6d. each, bound.

⁂ *In this Edition the Narrative since the year* 1815 *has been remodelled, and the History continued to the middle of* 1862.

This work contains numerous synoptical and other tables, to guide the researches of the student, with sketches of literature, antiquities, and manners, during each of the great chronological epochs. The author has had great experience as a teacher and lecturer on history, and he has drawn from the best sources, English and foreign, in the execution of his task.

School-Books

BY JOHN WHITE, F.E.I.S.,

Late Teacher of English, Geography, and History, Edinburgh;

PUBLISHED BY

OLIVER AND BOYD, EDINBURGH;

SIMPKIN, MARSHALL, AND CO., LONDON;

AND SOLD BY ALL BOOKSELLERS.

THE FIRST BOOK for Children. *New Edition*............1½d.

THE SECOND BOOK for Children. *New Edition*.........3d.

THE THIRD BOOK for Children. *New Edition*. 10d. bound.

THE FOURTH BOOK for Children, with numerous Exercises. *New Edition*. 1s. 6d. bound.

A SYSTEM of ENGLISH GRAMMAR, and the Principles of Composition, with numerous Exercises, progressively arranged. *New Edition*. 1s. 6d. bound.

AN ABSTRACT of GENERAL GEOGRAPHY; comprehending a more minute Description of the British Empire and of Palestine or the Holy Land; and including the Sacred Geography of Egypt, Arabia, Syria, Mesopotamia, Babylonia, Assyria, Persia, Media, Asia Minor, etc. With numerous Exercises. For the use of Junior Classes. *New Edition*. Price 1s. cloth; or with *Four Maps*, 1s. 3d.

A SYSTEM of MODERN GEOGRAPHY, with Outlines of ASTRONOMY and PHYSICAL GEOGRAPHY; comprehending an Account of the principal Towns, Climate, Soil, Productions, Religion, Education, Government, and Population of the various Countries. To which are added, Sacred and Classical Geography, Problems on the Globes, and numerous Exercises on each separate Country. *New Edition*. Price 2s. 6d. bound; or with *Four Maps*, 2s. 9d.

AN ELEMENTARY ATLAS of MODERN GEOGRAPHY, consisting of Ten Maps, full-coloured, from the latest and best Authorities. Price 2s. 6d. cloth.

A NEW SCHOOL ATLAS of MODERN GEOGRAPHY, consisting of Twenty-four Maps, full-coloured, from the latest and best Authorities. Price 6s. half-bound.

A NEW MAP of PALESTINE, full-coloured; with Part of Egypt and Arabia, and a Plan of Jerusalem, from the latest and best Authorities. For the Use of Schools and Private Families. 1s. 6d.